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Soil Survey
of
Scurry County, Texas

By

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and

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Texas Agricultural Experiment Station

Bureau of Chemistry and Soils

In cooperation with the
Texas Agricultural Experiment Station

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Map.

SOIL SURVEY OF SCURRY COUNTY, TEXAS

By E. H. TEMPLIN, in Charge, and T. C. REITCH, Texas Agricultural Experiment Station

COUNTY SURVEYED

Scurry County is in the west-central part of Texas (fig. 1), about 200 miles west of Fort Worth. It includes an area of 910 square miles, or 582,400 acres.

This county lies in the southern part of the Great Plains area of the United States, in the southwestern part of the Rolling Plains of Texas. It is about 30 miles east of the High Plains and about 60 miles north of the Edwards Plateau. It consists of two plains—a higher comparatively small, smooth constructional plain and a lower, rolling dissected plain. The higher plain occupies a narrow belt extending diagonally across the center of the county. It is separated into two parts—the Fluvanna Flat in the northwest and the Roscoe Divide in the southeast—by a shallow gap about 10 miles wide. The lower plain occupies lower areas on the southwest and northeast of the central highland strip and comprises about five-sixths of the total area of the county.

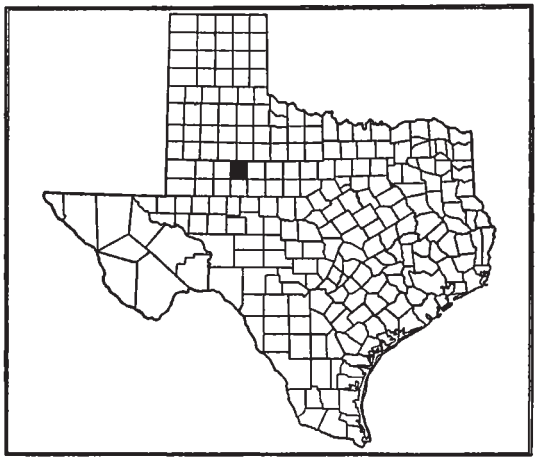

FIGURE 1.—Sketch map showing location of Scurry County, Tex.

On the two remnants of the higher constructional plain, regional drainage lines have not developed, and run-off water collects in intermittent lakes which occupy depressions formed through ground settlement. The land is very smooth, and practically all the surface has a slope of less than 2 percent. The elevation at Fluvanna is 2,665 feet above sea level, at Hermleigh 2,438 feet, and at Inadale 2,396 feet.[1] The characteristics of drainage and surface relief are the same as those prevailing on the High Plains, and the two areas are isolated islands of that physiographic province. These two remnants are surrounded by a slight, or moderately sharp, caliche escarpment extending downward to the lower plain and constitut-

[1] Elevations obtained from the Roscoe, Snyder & Pacific Railway Co.

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ing a drop ranging from 50 to 100 feet in most places. The northern part of the Fluvanna Flat is underlain by an isolated remnant of Cretaceous limestone which outcrops along the northern escarpment, forming an abrupt cliff several hundred feet high, locally known as the Blue Mountains. The southern edge of this limestone remnant is buried beneath later geological deposits covering the Fluvanna Flat and accordingly forms no topographic feature. The Fluvanna Flat, the Roscoe Divide, and the intervening gap constitute the divide between the drainage basins of Colorado and Brazos Rivers.

The lower plain is more variable. Dominantly it consists of a series of broad shallow eroded valleys. Slopes ranging between 1- and 3-percent gradient predominate, and, with the exception of a very few ground-settlement depressions, regional drainage is thorough. The exposed geological materials consist largely of clays and sands, which erode easily and evenly. A more resistant layer of gravel and conglomerate forms a gentle south-facing escarpment from 1 to 2 miles wide, which extends west from the western edge of the Roscoe Divide through the central part of the county. In the southwestern corner, Colorado River has cut a narrow rough valley bordered with low sandstone cliffs. A triangular area, embracing about 100 square miles in the northeastern corner, consists of rough, severely eroded, badlands country adjacent to the Double Mountain Fork of Brazos River. The larger tributaries to Colorado River and Colorado River within the upper half of its course through the county have built up flood plains ranging from one-fourth to 1 mile in width. Within a few miles of the river, its tributaries drop into shallow canyons and the flood plains end. At very infrequent intervals these flood plains are covered for a few hours with overflow water. The elevation of the Double Mountain Fork of Brazos River, at the northeast corner of the county, is about 1,850 feet above sea level.[2]

Well water of good quality is obtainable in most places. Within the general areas occupied by the Vernon soils, the well water is commonly less plentiful, and a large proportion of it has a bad taste. So far as is now known there is no artesian water supply occurring in any section of the county in sufficient quantity and at a favorable depth to furnish a practical source for extensive irrigation.

With the exception of the very rough and the very sandy areas, the county and surrounding country were originally covered with a thick growth of short plains grasses. Buffalo grass (*Buchloe dactyloides*), which is known locally and throughout northwest Texas as " mesquite grass ", grew in an almost pure stand, especially on the heavy-textured soils, in association with minor quantities of blue grama (*Bouteloua gracilis*), needlegrass (*Stipa* sp.), and a few other plants. Occasional stunted mesquite trees (*Prosopis chilensis*) dotted the plain. Stream bottoms were covered with a good sod of grass and a thicker growth of mesquite brush.

At present a few cottonwood and hackberry trees grow along the larger stream channels. The very sandy soils are covered with a stunted growth of shin oak brush (*Quercus* sp.), some little bluestem (*Andropogon scoparius*), sand sagebrush (*Artemisia filifolia*), and minor quantities of various other grasses and weeds. During

[2] Estimated from the elevation of the Double Mountain River about 4 miles east of the northeast corner of the county.

occasional wet winters and springs, annuals, including several legumes, make considerable growth. With heavy grazing the stand of buffalo grass has become less pure, and the different weeds, needlegrasses, and mesquite brush have become more abundant. The only native plants which become serious weed pests in cultivated fields are the blueweed (*Hilaria belangeri*), which was originally present only in and near lake beds, and a plant known as mesquite weed.[3]

The first family in Scurry County settled at the present site of Snyder in 1877. The county was organized in 1884. Most of the early settlers came from the older parts of Texas.

According to the census reports, the population was 102 in 1880, 1,415 in 1890, 4,158 in 1900, 10,924 in 1910, 9,003 in 1920, and 12,188 in 1930. The census of 1930 gives the density of population as 13.7 persons a square mile and classes 75.3 percent of the total population as rural. The entire urban population is included in the city of Snyder. The rural population is rather evenly distributed, with the exception of the rough northeastern corner where it is very sparse. Nearly all the people are native whites.

Snyder, the county seat, had a population of 3,008 in 1930. This city is the marketing and distribution center for most of the farm products. A number of villages are conveniently located throughout the county and serve as local trading centers.

Transportation facilities are good. The two railroads make good connections with routes extending in all directions. Nearly all points are within 15 miles of a good railroad shipping point. The public-road system is good. One State highway extends from the southeast to the northwest corner of the county and another crosses east and west through the middle. Most of the county roads are graded dirt roads and are kept in good repair.

Most parts of the county are supplied with rural delivery of mail, telephones are in common use, and the public-school system is well developed.

CLIMATE

The climate of Scurry County is subhumid, warm, and of a continental type. The average annual rainfall of nearly 21 inches is such that crop yields are determined largely by moisture conditions. Cultural practices are based primarily on methods for the conservation of soil moisture. From the point of view of farming, the climate is such that the most important soil characteristics are those physical factors which determine moisture relationships. The choice of crops is limited by the climatic conditions, and the most successful ones are those of drought-resistant qualities.

There is a pronounced season of low rainfall during the cool months—November to March, inclusive—each of which receives an average monthly rainfall of less than 1 inch; and a season of greater precipitation extending from April through October, each month of which receives an average monthly rainfall of about 2 inches. As a rule, the rains begin somewhat too late in the spring for very successful production of small grains. Local showers and thunderstorms are the common form of rain during warm weather.

[3] The plants mentioned in this report were identified by V. L. Cory, range botanist, Texas Agricultural Experiment Station.

There is a difference of about 38° F. between the normal temperatures of winter and summer. The winters are mild with occasional cold spells. During summer, the days range from warm to hot and the nights are cool. The average length of the frost-free season is 214 days, from April 3 to November 3. It is sufficiently long for cotton to mature well before frost, and there is considerable latitude in the optimum planting time for such quickly maturing crops as grain sorghums and sorgo. Hardy vegetables grow throughout the winter, but orchard fruits are very frequently damaged by spring frost.

Occasional hailstorms damage crops over small areas. The snowfall is very light and remains on the ground only a short time. A very large percentage of the days are clear, the atmosphere is dry, and the evaporation is high. The average wind velocity is high, especially during the spring.

Table 1, compiled from records of the Weather Bureau station at Snyder, gives the normal monthly, seasonal, and annual temperature and precipitation for Scurry County.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Snyder, Scurry County, Tex.*

[Elevation, 2,450 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1917)	Total amount for the wettest year (1932)	Snow, average depth
	° F.	° F.	° F.	*Inches*	*Inches*	*Inches*	*Inches*
December	41.3	77	8	0.88	0.00	4.10	1.3
January	40.5	84	1	.48	.34	1.78	1.1
February	44.3	92	8	.48	.00	3.01	(1)
Winter	42.0	92	1	1.84	.34	8.89	2.4
March	51.5	94	13	.99	.34	.05	.5
April	61.0	99	20	2.82	.88	2.25	.0
May	69.6	105	36	2.84	.99	3.57	.0
Spring	60.7	105	13	6.65	2.21	5.87	.5
June	78.3	109	40	2.21	.83	3.12	.0
July	81.5	109	52	1.66	1.04	1.12	.0
August	80.7	108	46	2.51	2.18	5.79	.0
Summer	80.2	109	40	6.38	4.05	10.03	.0
September	73.4	104	35	2.29	1.53	10.60	.0
October	62.6	97	20	2.60	(1)	.43	.0
November	50.6	86	4	.91	.02	.00	.4
Fall	62.2	104	4	5.80	1.55	11.03	.4
Year	61.3	109	1	20.67	8.15	35.82	3.3

[1] Trace.

AGRICULTURE

Cattle ranching was the first type of agriculture practiced in Scurry County and the surrounding country. It began in 1878, immediately following the killing off of the buffalo. The heavy growth of nutritious grasses, the mild climate, and cheapness of the

land made this general region especially suitable for livestock raising. At first the ranchers depended solely on the native grasses for livestock feed, and the only farming consisted of growing some vegetables for home use.

About 1890, considerable areas began to be broken up and placed under cultivation, and by 1910, the value of crops produced exceeded the value of livestock. The process of converting the ranches into farms has continued at an increasing rate, with the exception of temporary setbacks following very droughty years, such as 1917 and 1918. This change is nearing its limit, fixed by the total area of soil well adapted to crop production, but as shown by census figures to date the rate of change has not slackened. During the period 1925 to 1930 the average increase in the area of land in crops was 12,000 acres a year.

At first corn was the most important feed crop. Following the introduction and demonstration of the superiority of the grain sorghums and sorgos about 1900, these crops have constituted almost the entire feed crop, and corn has become of very minor importance. Some cotton was grown as early as 1889, and the ratio between the acreage of cotton harvested and the total acreage of crop land harvested has increased from 34 percent in 1899 to 65 percent in 1929. Prior to 1920, rather large areas on the Roscoe Divide and Fluvanna Flat were devoted to winter wheat and, to a less extent, other small grains, but since that time these crops have not been important.

Table 2 shows the acreage devoted to the principal farm crops in Scurry County as reported by the Federal censuses.

TABLE 2.—*Acreage of principal crops in Scurry County, Tex., in stated years*

Crop	1889	1899	1909	1919	1929
	Acres	*Acres*	*Acres*	*Acres*	*Acres*
Cotton	1,145	7,422	37,129	42,275	129,404
Milo and kafir			50,978	32,929	3,695
Wheat	246	701		6,008	695
Corn	822	4,087	2,573	2,997	422
Oats	808	354	21	1,530	120
Coarse forage		5,659	6,714	15,840	38,041

Crop farms—that is, farms on which the production of cash crops constitutes the main source of farm income—occupy about two-thirds of the land in the county. Cotton is the main cash crop and occupies from 60 to 80 percent of the cultivated land. The feed crops—grain sorghums and sorgos—are largely fed on the farms where grown, although some are sold, especially during years when yields are better than average. Cotton, grain sorghums, and sorgos are practically the only crops grown, and together they occupy about 99 percent of the total crop land.

Farming is done on a fairly extensive scale. The average farm family handles more than 100 acres of cultivated land, the greater part of which is in cotton. Less than 5 percent of the county is held in farms smaller than 100 acres, and a number of crop farms include 640 or more acres. On the crop farms returns from livestock are of minor importance.

According to the 1930 Federal census, the total value of all crops produced in the county in 1929 was $2,048,151, dairy products were produced to the value of $108,487, and poultry and eggs to the value of $364,812. The total number of farms reported, which includes both the crop farms and the livestock ranches, was 1,077 in 1920, 1,332 in 1925, and 1,564 in 1930. The total value of all domestic animals on farms and ranches on January 1, 1930, was $1,549,806.

Table 3, compiled from the Federal census reports, gives the number of domestic animals on the farms and ranches in 1910, 1920, 1925, and 1930.

TABLE 3.—*Number of domestic animals on farms and ranches in Scurry County, Tex., in stated years*

Year	Cattle [1]	Horses	Mules	Sheep	Goats	Swine	Chickens
1910	24,837	6,486	2,948	972	44	5,541	[2] 51,670
1920	14,433	4,438	1,993	2,078	112	3,826	50,589
1925	12,118	4,153	3,721	2,503	68	1,650	65,011
1930	20,288	4,696	3,976	17,738	143	2,520	88,750

[1] Mainly beef cattle.

[2] All poultry.

The livestock ranches, enterprises concerned chiefly with the grazing of cattle or sheep on native pastures, occupy about one-third of the county. They are located largely in the rough country unsuitable for crop farming. This land includes the northern part of the county and a smaller district in the southwestern part adjacent to Colorado River and Bull Creek. The livestock ranches no longer include a large amount of land well suited for crop farming, and livestock raising will persist throughout most of the area it now includes. The ranches include from 1 to 50 sections of land.

Approximately one-half the county consists of land well suited to crop production, one-fourth is marginal land which has little suitability for cropping purposes, and one-fourth is land entirely unsuited for crop production, which can be used as grazing land only. It is estimated that the distribution of the 205,523 acres (321 square miles) of total crop land reported by the Federal census for 1930 was such that about 60 percent of the good land and 10 percent of the poor crop land were in cultivation.

Many of the farmhouses are cheaply built and do not have modern conveniences. The other farm buildings are few and small. Livestock receive little shelter. Machinery and feedstuffs are generally stored in the open. The farms and ranches are fenced with barbed wire.

In 1930 there were 1,268 automobiles, 106 motor trucks, 79 tractors, 31 electric motors for farm work, and 37 stationary gas engines on the farms. Nearly all the tractors are of the row-crop type. Much of the animal-drawn machinery is of the two-row type, and work animals are commonly used in teams of 6 or 8. The investment in farm machinery is small. The farm equipment commonly includes 1 or 2 listers, planters, and cultivators, and a few hand implements.

In 1930, owners operated 638 of the farms and ranches, tenants 920, and managers 6. The percentage of tenancy increased from 22.9 percent in 1900 to 58.8 percent in 1930, and this increase corre-

sponded to the change from livestock ranching to crop farming. Most of the tenant farms are leased for a share of the crop. A few ranches are leased for cash.

Land values have decreased somewhat in recent years. Land suitable for grazing purposes only sells for considerably less than good crop land.

Very little outside labor is hired on the crop farms, except at cotton-picking time, when it is frequently difficult to obtain sufficient help. Most of the labor is hired on the livestock ranches and is paid from $30 to $60 a month with board and lodging.

On the crop farms, industries other than crop production are of minor importance. As a rule, the farmers produce sufficient poultry products, dairy products, and meat for family use and sell a small excess. Some sour cream is shipped out to creameries from 50 to 500 miles distant. There are a few small dairy farms and chicken farms in the vicinity of Snyder, which supply the dairy, poultry, and egg needs of that city. Large quantities of fruits and vegetables are canned on the farms for consumption at home.

On the livestock ranches, the breeding and raising of high-grade Hereford cattle is the main industry. Except during the winter, when there is commonly some supplemental feeding of cottonseed cake, the native grasses and other plants constitute the whole ration of the cattle. The grazing land carries from 20 to 40 head of cattle to the section, depending on the type of soil, the season, and the quantity of cottonseed cake fed. On a few ranches small quantities of grain sorghums and sorgos are grown and fed to the range cattle. Generally the cattle are not fattened on the ranches but are sold to feeders in other sections of the country. Occasionally, during good seasons, the cattle naturally fatten on the native grasses. This is commonly considered a good cattle country, as the weather is sufficiently mild and the country sufficiently broken that cattle require no winter shelter.

Cotton gins are located at Snyder, Hermleigh, Inadale, Dunn, Ira, and Fluvanna, and there is a cottonseed-oil mill in Snyder.

Seed-bed preparation commonly begins with bedding the land in early winter. Cotton and the sorghums are planted with a lister planter on the old bed and in the new furrow. Most of the cotton and grain sorghums are planted between May 15 and June 15, depending on moisture conditions, and the sorgos may be planted somewhat later. No definite rotations are followed, but feed crops are generally followed by cotton. Commercial fertilizers are not used, and barnyard manure is not carefully saved.

Cotton is given from 2 to 4 cultivations, depending on the rains and the weed growth. About half of it is chopped. Commonly it is harvested by snapping, and a little is harvested by sledding. The sorghums are cultivated from 2 to 4 times and are harvested by heading or cutting with a row binder.

SOILS AND CROPS

In general the soils of Scurry County are dark colored and comparatively fertile. With minor exceptions, they are underlain at some depth below the surface by an almost white chalklike layer which is commonly known as " chalk " or " caliche " and which con-

tains more carbonate of lime than the material either above or below it. The soils are neutral or basic in reaction and are not in need of lime. The rain water which soaks into the soil is held within a few feet of the surface until removed by plant roots or evaporation, and no appreciable amounts of either water or nutrients are lost through leaching. Below a depth which varies, according to the slope of the land and the sandiness of the soil, from 4 to 10 feet, the soil material is, for all practical purposes at least, permanently dry. These features, which are possessed to greater or less degree by all the soils, are the result of the prevailing climate.

The individual soils differ in such characteristics as degree of darkness of the topsoils, content of organic matter, thickness of the soil layers, depth of red color, content of carbonate of lime, texture (sandiness or heaviness), and structure. The smooth sandy soils have rather distinct surface soil and subsoil layers; that is, they have a sandy surface soil underlain by a heavier subsoil which contains more clay. The heavy soils and the soils occupying stream bottoms do not have distinct surface soil and subsoil layers, in the sense that these terms are applied to the sandy soils of Scurry County or as commonly applied to the soils of humid regions. In local usage the term " subsoil " is applied to two entirely different layers, depending on the soil under consideration. As applied to the sandy soils it refers to the heavier textured true subsoil. As applied to those soils which have no well-defined, heavier textured subsoil it commonly refers to the chalklike layer.

Owing to differences in soil character, the soils differ in their ability to produce good yields of crops. Therefore they may be grouped, according to their suitability for crop production, as good crop soils, fair and poor crop soils, and soils unsuitable for farming. The group of good crop soils includes smooth sandy soils, smooth heavy soils, and soils occupying stream bottoms. The group of fair and poor crop soils includes sloping shallow soils, very sandy soils, and a soil occupying lake beds—Randall clay. The group of soils unsuitable for farming includes rough broken and stony land, several stony soils, and one very droughty soil (Vernon clay) which could be cultivated though not profitably under present economic conditions. Figure 2 outlines the general occurrence of the soils of these groups.

The common crops of the county—cotton, grain sorghums, and sorgo—are adapted to a wide range of soil conditions. Inasmuch as the rainfall is in general less than that required for the highest yields of these crops, differences in the productivity of the various soils are caused largely by differences in their ability to furnish plants with water during dry periods rather than by differences in fertility. This is further shown by results obtained from fertilizer applications. As a rule they have given no increases and where applied in moderately large quantities have been detrimental in some cases. Adapted varieties of cotton, grain sorghums, and sorgos are approximately equal in their ability to produce fair yields with a limited moisture supply. During dry years the yields of each crop are reduced nearly proportionally (*1*, *5*).[4] These crops have

[4] Italic numbers in parentheses refer to Literature Cited, p. 45.

the same relative adaptations on the more droughty soils as on the less droughty soils. Cotton occupies 70 percent and grain sorghums and sorgo together 29 percent of the cultivated good crop soils, and they occupy nearly the same proportions of the cultivated fair and poor crop soils. The selection of these crops in Scurry County is determined by climatic and economic rather than by soil conditions.

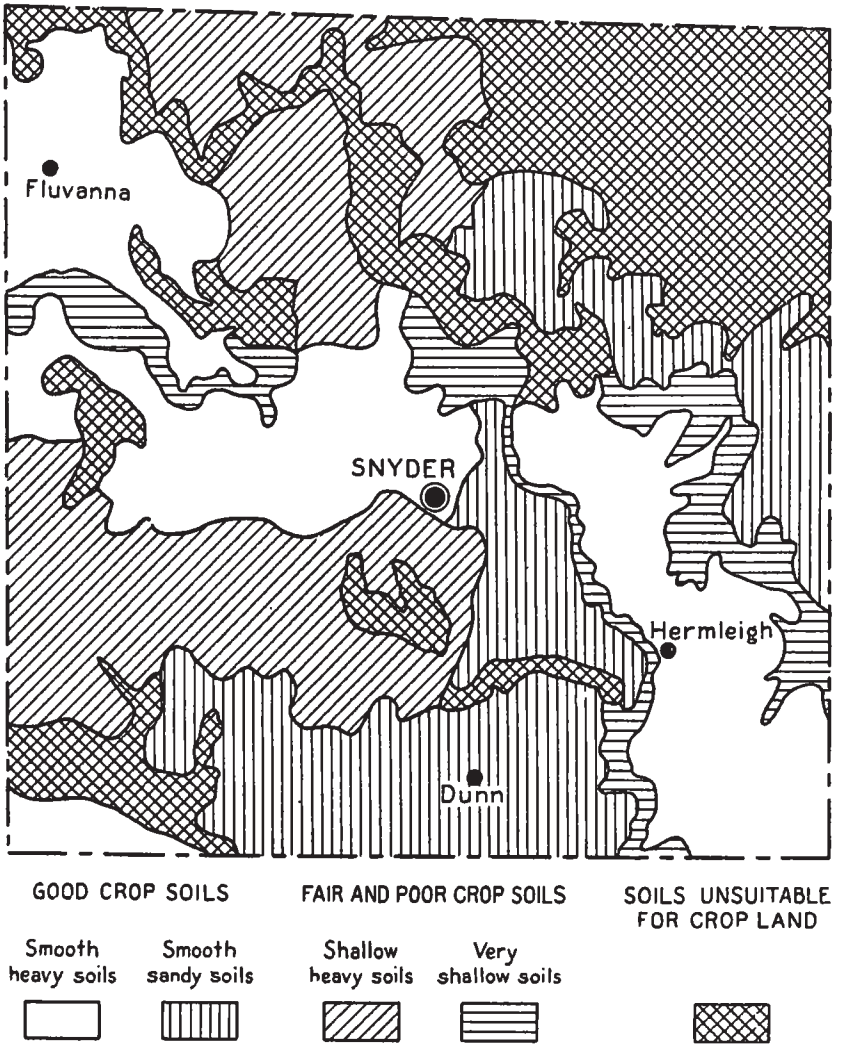


FIGURE 2.—Sketch map showing the distribution of soil groups in Scurry County, Tex.

In general, the farmers grow as large an acreage of cotton as they can handle and plant only sufficient areas of grain sorghums and sorgos to supply feed for work animals and other farm animals.

Corn is a crop which is not well adapted to the existing climatic conditions (7), as it cannot withstand dry spells and hot winds as

well as cotton and the sorghums, despite the fact that it has a relatively low water requirement. With the exception of small patches grown for roasting ears, corn is grown only on the very sandy soils which are the most drought resistant. Small grains also are not well adapted to the climatic conditions. Normally they start active growth in the spring before the late spring rains commence, and their growth is stopped and maturity is forced by lack of moisture. During occasional years with wet winters, good yields are obtained. Most of the small area devoted to winter wheat and other small grains is composed of clay loam and loam soils, since these are much less subject to blowing than the sandier soils.

About 100 acres of alfalfa are grown under irrigation. Most of this crop is grown on Spur clay loam, but it is apparent that any of the good crop soils are adapted to the production of alfalfa if irrigation water can be supplied. Several attempts have been made to grow this crop without irrigation, all of which have been rather unsuccessful. Alfalfa requires more water in relation to the amount of crop produced than any other common field crop (*8*). It appears that its successful production without irrigation in this county is limited to places where it can obtain considerable water from some source other than rainfall. Since the upland soils are all underlain at a depth of a few feet by permanently dry material, they are not suitable for this crop. Alfalfa may prove successful in certain bottoms which are subject to fairly frequent overflow or in abnormal places where there is a water-bearing stratum at a depth of not more than 25 feet below the surface. It would probably not be very successful on most areas of bottom soils, as most of these soils are flooded only infrequently.

Although there is very little relationship between the cultivated crops grown and the kinds of soil, there is very definite selection of the soils used for the production of cultivated crops, in contrast to those used for grazing. In 1931, approximately 65 percent of the good crop soils, 10 percent of the fair and poor crop soils, and none of the soils unsuited for farming were in cultivation.

Estimates of the average acre yields obtained on the good crop soils, based largely on census data and reports on the quantity of cotton ginned, are as follows: Cotton, one-fourth bale; grain sorghums, 15 bushels; and sorgos, 1½ tons of forage. Results obtained at the experiment stations at Big Spring (*1*, *7*), Lubbock (*5*, *6*), and Spur (*6*) show that average yields of one-half bale of cotton, 20 bushels of grain sorghums, and 3 tons of sorgo forage are obtained on these soils when best farming practices are followed. Yields on the fair and poor crop soils are from one-half to three-fourths as large as those obtained on the good crop soils.

Though all the soils included in the group of good crop soils average about the same yields over a period of years, the smooth sandy soils and the smooth heavy soils yield differently in individual years. The smooth sandy soils are more drought resistant than the smooth heavy soils and during dry years yield better. The smooth heavy soils are somewhat more fertile than the smooth sandy soils, and during years of more and better distributed rainfall than average they yield somewhat better.

The more drought-resistant character is an inherent feature of the sandier soils. Throughout the wide range of texture, from fine sand to clay, represented by the soils of Scurry County, the drought resistance of a soil varies directly with its sandiness. The very sandy soils are the most drought resistant, the clays most droughty, and the loams intermediate. These differences in drought resistance are caused largely by some factor or factors other than differences in the quantity of water lost as run-off, though differences in loss as run-off are important factors on all except the very smooth or well-terraced fields. Nearly level, contour-cultivated fields of Abilene clay loam, in which all the water is held where it falls, are less drought resistant than similar or somewhat more sloping fields of Miles fine sandy loam. In this general region water can be lost or removed from soils in only three ways—by running off the surface, by direct evaporation, and through absorption by plant roots. It is evident that differences in the amounts left available for crop growth must be due to differences in the amounts lost through evaporation on weed-free fields where loss as run-off has been eliminated. Losses through evaporation occur largely from the topmost 3 to 6 inches of soil. In the sandy soils the moisture passes down through the surface layers and also penetrates to depths below those where losses from evaporation are considerable much more quickly than in the heavier soils. Consequently evaporation losses are less. Presumably this is the main cause of differences in drought resistance between soils of different textures. Another probable cause is that on the heavier, more fertile soils crops make a more vigorous growth as long as moisture is available. They have a tendency to make a too-heavy early growth and do not have enough moisture left to reach maturity without being stunted. This is presumably the chief reason that crops do not dry up so quickly on the very shallow "chalky" soils, such as Potter loam, as on the good deep Abilene clay loam.

In the classification used in this report, soils similar in characteristics other than texture are given a series name, such as Miles or Abilene, which is generally the name of the locality where such soils were first identified. The name of the soil type consists of the series name followed by the class name of the texture of the surface soil. Minor soil differences, which may have important agricultural significance, are designated as phases.

In this discussion, the soils have been grouped according to productivity. Such a grouping places soils of different series together, and, in order to supply a clearer picture of the differences between the several series, a brief outline of the outstanding characteristics of each is given.

The Miles soils are the smooth reddish-brown soils of the county. They have dark reddish-brown surface soils overlying reddish-brown subsoils. A well-defined, almost white, chalklike layer lies at a depth ranging from 3 to 10 feet below the surface, depending on the texture of the surface soil and the slope of the land. In all except the clay loam member, the subsoil is distinctly heavier in texture than the surface soil. The upper soil layers, to a depth of about 24 inches in the clay loam and deeper in the sandy members, contain no free carbonate of lime.

The Vernon soils are the compact reddish-brown or red soils occupying sloping areas. They are less dark, less friable, and shallower than the Miles soils. Carbonate of lime is present in all layers from the surface down. These soils do not have a distinctly heavier textured subsoil. The chalklike layer is less definite, occurs within less than 3 feet of the surface, and is poorly defined or absent in the clay member of the series.

The Weymouth soils are reddish-brown or red soils having friable rather granular thin subsoils which grade at a slight depth into "Red Beds." They resemble the Vernon soils but are less dense in structure.

The Abilene soils where typically developed have dark-brown surface soils overlying chocolate-brown soil layers which are underlain by a well-defined chalklike layer. Carbonate of lime is present in all layers within 18 inches of the surface. These soils do not have a distinctly heavier textured subsoil beneath a less heavy surface soil. The most apparent difference between these soils and the Miles soils is that they are darker and less red.

The Roscoe soils have very dark brown or nearly black surface soils underlain by dark-brown and brown lower soil layers. The most apparent difference between these soils and the Abilene soils is that they are darker. However, they do not contain carbonate of lime so near the surface as the Abilene soils, and the chalklike layer lies much deeper. These soils occupy slight depressions where some water from higher levels collects and stands for very short periods. They are well drained only in the sense that in this region rainfall is usually insufficient to cause water to stand for a long time.

The Potter soils have brown or grayish-brown very shallow surface soils underlain by a chalklike layer at a depth ranging from 4 inches to 2 feet. They are less dark, more sloping, more eroded, and shallower than the Abilene soils. They are known as "chalky land."

The Valera soils differ from the Abilene and Potter soils in the underlying geological formation which is hard limestone. Valera clay loam is similar to the shallow phase of Abilene clay loam, and the stony loam is similar to Potter gravelly loam.

Randall clay, which is the only member of the Randall series mapped, is bluish gray. It occurs in intermittent lake beds. It is poorly drained and covered with water for considerably longer periods than are the Roscoe soils.

The Spur and Miller soils occupy stream bottoms subject to overflow, and they consist of practically unchanged filled-in material. To a depth of 3 feet the material is somewhat darker than that below this depth. These soils do not have an underlying chalklike layer. They are calcareous from the surface down. The Spur soils are dark brown, and the Miller soils are dark reddish brown.

In the following pages the soils of Scurry County are described in detail, and their agricultural relationships are discussed; their location and distribution are shown on the accompanying soil map; and their acreage and proportionate extent are given in table 4.

TABLE 4.—*Acreage and proportionate extent of the soils mapped in Scurry County, Tex.*

Type of soil	Acres	Per-cent	Type of soil	Acres	Per-cent
Miles fine sandy loam	72,000	12.4	Vernon clay loam	42,816	7.4
Miles loamy fine sand	4,224	.7	Valera clay loam	2,496	.4
Roscoe fine sandy loam	3,008	.5	Potter loam	25,728	4.4
Potter fine sandy loam, deep phase	14,400	2.5	Potter fine sandy loam	10,368	1.8
Weymouth very fine sandy loam	1,152	.2	Miles fine sandy loam, shallow phase	1,664	.3
Abilene clay loam	100,800	17.3	Miles fine sand	6,016	1.0
Miles clay loam	25,024	4.3	Miles fine sand, shallow phase	1,792	.3
Roscoe clay	2,304	.4	Randall clay	4,416	.8
Abilene loam	36,480	6.3	Potter gravelly loam	45,248	7.8
Miles loam	13,568	2.3	Valera stony loam	2,240	.4
Roscoe loam	3,712	.6	Vernon clay	20,800	3.6
Spur loam	5,568	.9	Weymouth very fine sandy loam, eroded phase	3,136	.5
Spur clay loam	10,432	1.8	Rough broken and stony land	77,824	13.4
Spur fine sandy loam	1,408	.2			
Miller loam	2,816	.5			
Miller clay loam	3,008	.5	Total	582,400	-----
Abilene clay loam, shallow phase	37,952	6.5			

GOOD CROP SOILS

The group of good crop soils includes all the smooth deep soils of the county, with the exception of Miles fine sand and its shallow phase. All these soils are productive, fertile, and well adapted to the production of field crops. They occupy large smooth areas on which large-scale methods of agriculture can be practiced.

As already explained, the group of good crop soils includes two main kinds—smooth sandy soils and smooth heavy soils. The smooth sandy soils are Miles fine sandy loam, Miles loamy fine sand, Roscoe fine sandy loam, Potter fine sandy loam, deep phase, and Weymouth very fine sandy loam. The smooth heavy soils are Abilene clay loam, Miles clay loam, and Roscoe clay. Three other good crop soils—Abilene loam, Miles loam, and Roscoe loam—have agricultural characteristics intermediate between those of the sandy and heavy soils. The soils occupying stream bottoms subject to overflow, the Spur and Miller soils, make up the remainder of this group.

Miles fine sandy loam.—Miles fine sandy loam, locally known as "red sandy land", is one of the two extensive excellent soils of the county, and Abilene clay loam is the other. The Miles soil embraces a total area of 112.5 square miles and includes about one-third of all the land in cultivation. Its chief occurrence is as two main belts of rolling country, one of which extends from China Grove nearly to Knapp and the other from Ennis Creek School to a point south of Camp Springs. This soil completely dominates the soil character and agriculture of these and other smaller localities and occupies about four-fifths of their total area. Within the areas occupied mainly by this soil are small bodies of other soils, which are confined to narrow lowland strips bordering drainageways, and strongly sloping areas which occur as resistant knolls or as strips bordering the larger streams.

The 8- to 12-inch topsoil of Miles fine sandy loam consists of reddish-brown mellow fine sandy loam. This material merges with

the upper subsoil layer of friable reddish-brown clay loam containing considerable sand. With increase in depth the color gradually becomes less dark and below a depth of about 24 inches is dull red or brownish red. At a depth of about 40 inches the upper subsoil layer grades into the lower subsoil layer which is dull reddish-yellow loam, somewhat more friable than the upper part of the subsoil. At a depth ranging from 4 to 8 feet below the surface the lower part of the subsoil is abruptly underlain by an almost white chalklike layer consisting of a mixture of white carbonate of lime and dull-yellow loamy fine-earth material. The content of carbonate of lime slowly decreases downward from the top of this chalklike layer, and, within a depth ranging from 1 to 4 feet, the chalklike layer merges below with dull-yellow or light-brown calcareous loam containing some spots of white carbonate of lime. This lowest layer, which lies more than 6 feet below the surface, is largely unmodified geological material similar to that which was developed by soil-forming agencies into the overlying soil layers. It lies below the normal penetration of soil moisture and plant roots and continues downward without soil change. Locally it contains beds of water-worn gravel or consists of sandstone ledges.

Since this soil occupies well-drained level or gently sloping areas which were not subject to a great amount of erosion before cultivation, it has weathered deeply. Organic matter accumulated through a long period from the annual decay of the native grasses has imparted a dark color to those layers in which it is most abundant. Although the lower layers contain less than the surface soil, there is some organic matter throughout the range of penetration of plant roots. In comparison with the soils of the prairies and plains of cooler regions, the content of organic matter is not high, but it is sufficient to impart a good physical condition to the soil and to supply more nitrogen than crops require during normal seasons. Chemical analyses (*3*, *4*) of this soil and similar soils collected from nearby counties indicate that it contains a good supply of phosphorus and potash, the other plant nutrients in which some soils are most likely to be deficient. In respect to crop requirements, it contains relatively more of these elements than it does of nitrogen. Since water does not leach through this soil, such quantities of available phosphorus and potassium as have been liberated by weathering of the soil minerals have remained in the soil. No increases in yields of crops are obtained from the application of commercial fertilizers. Continuous cropping of this soil for 20 years has not decreased its fertility sufficiently to cause noticeable decreases in yields. Carbonate of lime is not present to a depth of about 40 inches, as indicated by field test with dilute hydrochloric acid, but it occurs in all layers below this. The carbonate of lime originally present in the upper layers has been dissolved, carried down, and deposited by water at a lower level to form the chalklike layer. However, the upper layers contain a good supply of calcium in some form other than the carbonate.

Miles fine sandy loam is one of the most productive soils in the county. It is favored by farmers, and about 65 percent of the total area was in cultivation in 1931. Most of the land not in cultivation is in small farm pastures. This soil is somewhat subject to soil

blowing and soil washing, and it requires careful farming. A good proportion of the fields are terraced, and practically all of them should be terraced. At the agricultural experiment stations located at Big Spring and Lubbock, on soils similar in physical character to this soil, the adaptation of crop varieties and cultural practices have been intensively studied. Average acre yields of one-half bale of cotton, 20 bushels of grain sorghum, 3 tons of sorgo forage, and three-fifths ton of cowpea hay are obtained on farms where the best farming practices are followed. Census figures and data on the quantity of cotton ginned in the county clearly indicate that the average yields actually obtained are between one-half and three-fourths of those obtained at the experiment stations.

Miles loamy fine sand.—The topsoil of Miles loamy fine sand is somewhat more sandy, loose, and thick, and slightly less dark than the corresponding layer of Miles fine sandy loam. Otherwise the two soils are very similar. The 8- to 16-inch surface soil of Miles loamy fine sand consists of slightly coherent very mellow or loose reddish-brown loamy fine sand. Old cultivated fields appear pale reddish yellow when dry, and freshly cultivated fields appear pale red. The upper part of the subsoil consists of brownish-red friable light clay loam which contains considerable sand. Below a depth of about 4 feet this merges with the lower subsoil layer which is reddish-yellow friable loam or fine sandy loam. At a depth ranging from 6 to 10 feet below the surface, the subsoil rests on an almost white chalklike layer. The quantity of carbonate of lime present in the chalklike layer gradually decreases with depth, and the chalklike layer grades within a depth ranging from 1 to 3 feet of its surface into dull-yellow calcareous loamy fine sand or fine sandy loam, containing a few white spots. All soil layers above a distance of about a foot from the chalklike layer are not calcareous, but below that depth they are.

Owing to the sandier texture of the topsoil, which allows moisture to more quickly penetrate to a depth where it is safe from loss by evaporation, this soil is slightly more drought resistant than Miles fine sandy loam. It is also more subject to soil blowing and slightly less fertile. It contains somewhat less organic matter and nitrogen. Farmers report that fields of this soil which have been cultivated for considerable time are somewhat less productive than when new, especially if they have been continuously cropped to cotton or if they have not been deeply plowed for several years. With continued shallow cultivation the finer soil particles settle below the immediate surface, leaving only the very sandy material on top, which blows very readily. Deep plowing, which thoroughly remixes the surface soil and brings up some of the heavier subsoil material in shallow places, is necessary at intervals ranging from 2 to 4 years. Continuous cropping to cotton, a crop that returns comparatively little crop residue to the soil, also tends to make this soil too susceptible to blowing. Some rotation with feedstuffs, which preferably are headed, leaving the stalks standing in the field through the winter to be turned under in the spring, is a necessary and a common practice. Since the quantity of plant nutrients originally present in this soil was rather low, some of the reported decrease in productivity on old fields is probably owing to decrease of fertility, though the increased susceptibility to blowing is the more important factor.

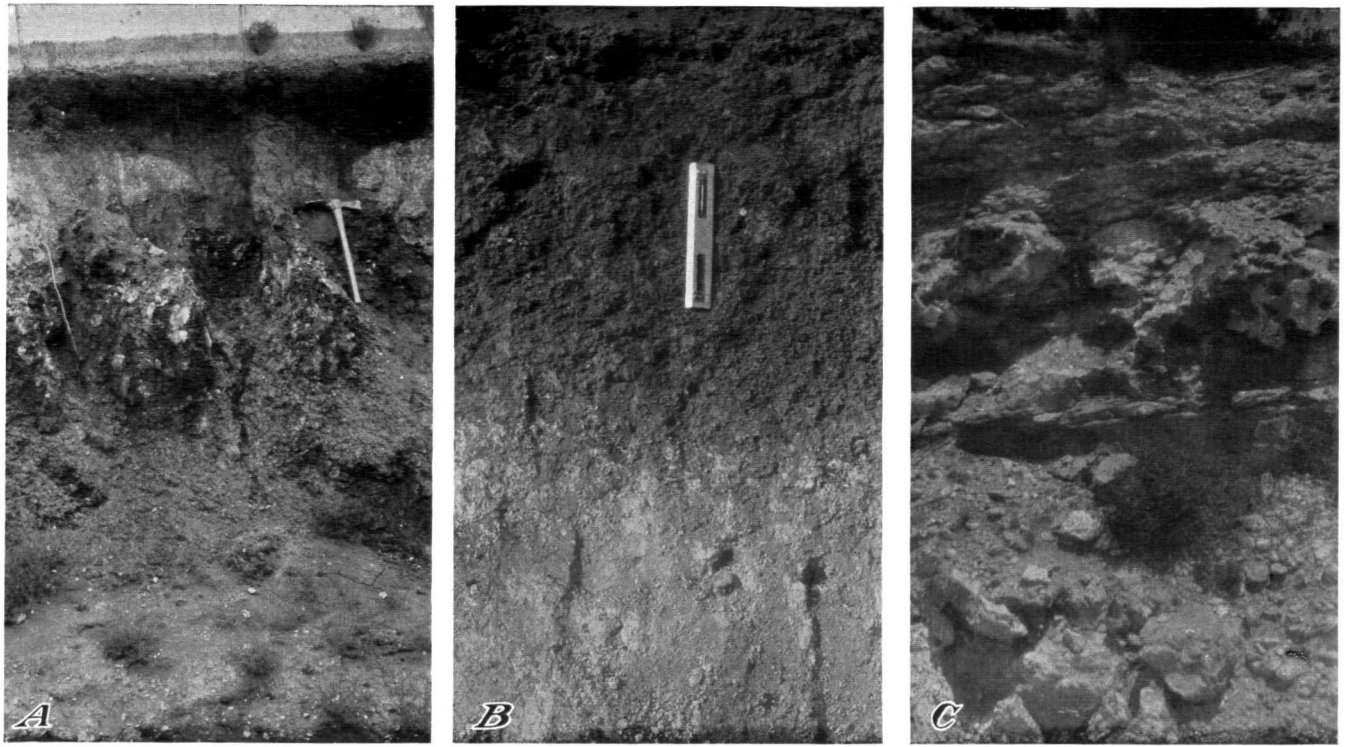
This comparatively inextensive soil occurs as a belt surrounding the large area of Miles fine sand southwest of Ira and in smaller areas elsewhere. The land is gently rolling, well drained, and not subject to much erosion. On account of the sandy and readily permeable character of the topsoil, most of the rainfall is absorbed as it falls, and comparatively little runs off. Terracing is not so necessary or so beneficial as on Miles fine sandy loam, and very little of this land has been terraced.

According to farmers' observations, yields on this soil average the same as on Miles fine sandy loam. They average somewhat higher during dry years and slightly lower during wet years. This soil is well liked by farmers, although it requires careful handling to prevent soil blowing, and living conditions on it are very disagreeable during sandstorms.

About 80 percent of the land is in cultivation. Cotton is rather less popular and the sorghums and corn are more popular than on Miles fine sandy loam. About 50 percent of the cultivated land is devoted to cotton, 40 percent to sorghums, and 5 percent to corn. A larger proportion of sorghums is grown on this soil than on the heavier soils, as these crops are somewhat less subject to damage by soil blowing, and it is easier to obtain stands of them than of cotton. This soil is more suitable for corn than are the heavier soils. Fruit crops and certain truck crops, such as watermelons, also do well.

Roscoe fine sandy loam.—Roscoe fine sandy loam, locally known as "black sandy land", is an inextensive soil occurring in association with Miles fine sandy loam as slight depressions or as low flats around the heads of drainageways.

The topsoil, which is 8 or 10 inches thick, consists of dark-brown mellow fine sandy loam. This grades below into the upper part of the subsoil, a very dark brown friable or somewhat compact heavy clay loam or clay. The dark color of the subsoil decreases with depth, from very dark brown in the upper 6 inches of the layer through dark brown to brown at a depth of about 24 inches below the surface. The structure and consistence of the subsoil also change at a depth of about 24 inches. The subsoil material above the 24-inch depth is faintly granular and when dry breaks into clods which shatter readily to irregular small lumps. These upper layers are easily penetrated by soil moisture and plant roots. Below a depth of 24 inches the subsoil, though of about the same texture, is more compact, shatters to cubelike fragments about one-half inch in diameter, and more nearly resembles "joint clay." Moisture and plant roots cannot so readily penetrate this layer. At a depth of about 3½ feet below the surface, the subsoil merges below with light-brown less compact fine sandy clay loam. At a depth ranging from 6 to 10 feet below the surface, the lower part of the subsoil is abruptly underlain by a friable nearly white chalklike layer. The content of the white carbonate of lime decreases with depth from the top of the chalklike layer, and within a depth of a few feet the material changes to dull reddish-yellow more compact loam or fine sandy clay loam. The surface soil and subsoil, to a depth ranging from 1 to 2 feet from the top of the chalklike layer, are not calcareous, but below that depth they are.



A, Profile of Abilene clay loam, shallow phase, showing thick zone of carbonate concentration; *B*, profile of Abiline clay loam, shallow phase, 2½ miles southeast of Dermott; *C*, profile of Valera stony loam, 4 miles north of Fluvanna.

This soil is more fertile and slightly more productive than Miles fine sandy loam. Owing to its slightly depressed or lower position, it receives some run-off water from the surrounding higher land. As is shown by the lower lying position of the chalklike layer, more water enters this soil and at times penetrates to a comparatively greater depth than in some of the other soils, even though the middle and lower subsoil layers are rather compact. The larger water supply has caused a heavier growth of grasses, and more plant remains have decayed on the surface and within the soil, imparting more organic matter and nitrogen to the soil, thus producing its darker color and greater fertility.

This soil is used for the same crops as Miles fine sandy loam, and about 60 percent of it is in cultivation. Yields average somewhat higher than on the Miles soil. During years when the land receives no extra moisture from the surrounding higher land it is somewhat more droughty than Miles fine sandy loam. It is slightly earlier and crops mature more quickly. Although this soil has a very gentle slope, owing to its occurrence as low flats, over which some water runs, certain areas have started to gully, especially along roadside ditches. Erosion may be retarded by terracing the surrounding higher land or by diking to shunt the overflow water. On this soil crops do not suffer from the effects of slow drainage. In this region of low rainfall the accumulation of excess run-off water is an advantage rather than a detriment as would be the case in more humid regions.

Potter fine sandy loam, deep phase.—Potter fine sandy loam, deep phase, is an inextensive soil which occurs as moderately eroded knolls and slopes within the general areas of Miles fine sandy loam or as gentle slopes at the bases of sharp slopes of severely eroded "chalky" soils. The topsoil ranges from 8 to 12 inches in thickness and consists of brown or slightly dark brown calcareous mellow fine sandy loam. It grades downward into light-brown highly calcareous friable fine sandy loam. Below a depth ranging from 15 to 20 inches the surfaces of all clods are coated with a thin white film of carbonate of lime. At a depth ranging from 24 to 42 inches below the surface, the soil rests on a layer of sandy whitish-yellow chalklike material from 1 to 4 feet thick, which grades downward into material containing less carbonate of lime—dull reddish-yellow highly calcareous fine sandy loam containing some white spots of carbonate of lime. A few small hard irregular lumps of carbonate of lime occur thinly scattered over the surface and throughout the upper soil layers.

This soil is somewhat eroded and varies in character, according to the degree of erosion that has occurred. In the smoother less eroded areas the surface soil has a somewhat red cast, the chalklike layer occurs at the greatest depth below the surface, and in places the topsoil is not calcareous. In the more eroded areas the soil is shallower, lighter colored, and in character resembles Potter fine sandy loam. In most of the areas occupying gentle slopes at the bases of sharp slopes, the chalklike layer is absent or is not present as a well-defined layer. Such areas represent a colluvial phase of washed-in material not shown separately on the map on account of its limited extent.

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Potter fine sandy loam, deep phase, is a comparatively fertile and productive soil. Yields are slightly less than on Miles fine sandy loam, especially on fields that have been in cultivation for some time and have not been terraced. On account of the greater slope, more water is lost as run-off than from Miles fine sandy loam, and terracing is more urgently necessary. In some of the older fields much of the darker more fertile topsoil has been washed away. Crops grown on this soil are practically the same as those grown on Miles fine sandy loam. On account of its sloping surface relief and occurrence in small areas, this soil constitutes less desirable farm land. About 40 percent of it is in cultivation.

Weymouth very fine sandy loam.—Weymouth very fine sandy loam occupies a few gently sloping small areas on Cottonwood Flat in the northeastern part of the county. It is less dark and is shallower than Miles fine sandy loam, and it is more red than Potter fine sandy loam, deep phase.

The topsoil consists of rather light reddish-brown calcareous very fine sandy loam containing a few hard irregular lumps of carbonate of lime. At a depth ranging from 5 to 8 inches, this material grades into light brownish-red calcareous very fine sandy loam containing numerous soft or semihard spots of lime. At a depth ranging from 3 to 5 feet below the surface, this material grades into light-red slightly calcareous very fine sandy beds of parent material, which contain almost white layers in a few places.

This soil is less fertile than Miles fine sandy loam. It is shallower and contains less organic matter and nitrogen. It is subject to considerable erosion, as is shown by its shallowness, even though it has only gently sloping surface relief. Some characteristic of this soil, possibly the very fine sandy loam texture, allows it to wash very readily. It requires terracing to prevent injurious erosion. Crop yields are slightly lower than on Miles fine sandy loam. The soil is well liked, although it occurs about 20 miles away from the nearest ginning and marketing point. About 40 percent of the land is in cultivation.

Abilene clay loam.—Abilene clay loam, locally known as "dark tight land", or "divide land", is the other extensive excellent soil comparable in importance with Miles fine sandy loam. It occupies a total area of 157.5 square miles and includes about one-third of all the cultivated land in the county.

Abilene clay loam occurs chiefly in two large smooth areas, the Roscoe Divide and the Fluvanna Flat. Within these localities it dominates the soil character and agriculture. It occupies about 90 percent of these areas, and the associated soils are confined to inextensive moderate slopes and to lake beds. This soil also occurs in smaller smooth bodies in other parts of the county.

The topsoil is about 16 inches thick, and it consists of dark-brown clay loam or clay. It is friable and consists of a mass of fine clods or coarse granules, weakly held together. On account of this structure the land is fairly easy to till, and if cultivated when not too dry or too wet it readily assumes an excellent tilth. It is easily penetrated by plant roots, moisture, and air. Typically the topsoil contains no free carbonate of lime, although in many places it is calcareous throughout. Below the topsoil and extending downward

to a depth of 3 or 3½ feet, the soil material consists of brown calcareous heavy clay loam or clay, which is more compact and has more of a "joint clay" character. It breaks to larger cubelike fragments about three-fourths inch in diameter. The topsoil can easily be spaded out without loosening with a pick or bar, but the underlying material cannot. Water and plant roots penetrate through it less readily than through the topsoil. At an average depth of 40 inches, but ranging between 30 and 48 inches, the soil material is abruptly underlain by yellowish-white very friable chalklike material commonly known as "chalk." The chalklike layer is about 2 feet thick, and it grades below into less limy friable brownish-yellow clay loam or clay, containing a few spots of white carbonate of lime. There is no further soil change downward from the top of this layer. It is geological material similar to that which was changed by plants and climate into the overlying soil.

This soil occurs in smooth well-drained areas, in which the material has weathered without erosion. Since it is heavier than Miles fine sandy loam, the organic matter derived from the annual decay of native grasses has decomposed more slowly, and somewhat larger quantities have accumulated, imparting to it a darker color. Water does not penetrate to so great a depth, and the chalklike layer which forms at the normal depth of moisture penetration occurs at less depth below the surface. On the slightly sloping areas the topsoil is slightly less dark than that on nearly level areas, and the lower soil layers have a chocolate cast. The area of this soil occupying the low flat surrounding the large lake about 4 miles southeast of Fluvanna is much more compact and droughty and contains numerous slick spots. Most of the small bodies occurring in the general region of Vernon clay loam, notably the area in the extreme southwestern corner of the county, are slightly more compact and less drought resistant than typical.

Approximately 65 percent of the total area of this soil was in cultivation in 1931. About 70 percent of the cultivated land is devoted to cotton and almost 30 percent to sorghums. This soil is more fertile, stronger, and less subject to blowing than Miles fine sandy loam, but it is somewhat less drought resistant because of its heavier texture and less permeability. Over a period of years, yields average about the same on these two rather diverse soils. The higher yields on Abilene clay loam during wet years compensate for the lower yields during dry years. This soil occupies smoother areas than the Miles soil and is somewhat more ideally adapted to large-scale farming. On many fields, running the rows on a level is sufficient to prevent loss of water as run-off and erosion, without the construction of terraces, but the more sloping areas require terracing. This soil is as well liked by farmers as Miles fine sandy loam, certain individuals preferring one or the other. Many owners who lease to tenants prefer it to Miles fine sandy loam, as it is less likely to be severely damaged by blowing or washing if improperly managed.

The results obtained at the agricultural experiment station located at Spur on this soil are applicable to this and similar soils in Scurry County.

Miles clay loam.—Miles clay loam, locally known as "chocolate tight land", differs only slightly from Abilene clay loam. So far as is known, the slight soil differences have no practical agricultural significance. Crop yields, crop adaptation, drought resistance, and fertility are apparently very similar. This soil is more red, and carbonate of lime does not occur so close to the surface as in Abilene clay loam. The average slope of the land is greater but well within the range typical for Abilene clay loam.

The topsoil, to a depth of 16 or more inches, consists of dark reddish-brown or chocolate-brown rather friable clay loam which breaks readily to fine clods or small granules similarly to the topsoil of Abilene clay loam. Field tests with dilute hydrochloric acid indicate that the material contains no carbonate of lime. Between depths of 16 and about 24 inches, the material is uniform and much like that above, but the color is reddish brown and the granules become coarser with increase in depth. Below a depth of 24 inches the soil material is reddish-brown rather compact heavy clay loam or clay which breaks into clods ranging from 1 to 2 inches in diameter. At an average depth of 4 feet, but ranging from 3 to 5 feet, the soil is underlain by a pinkish-white friable chalklike layer which ranges from 1 to 4 feet in thickness and merges below with dull reddish-yellow friable calcareous clay.

This soil occupies smooth slopes ranging between 1 and 3 percent in gradient. The largest areas are on Cottonwood Flat in the northeastern part of the county. About 40 percent of the land is in cultivation, the lower percentage than for Abilene clay loam being in part caused by the occurrence of the Miles soil in smaller bodies.

Roscoe clay.—Roscoe clay differs from Abilene clay loam in that it is darker in color and somewhat heavier in texture. It occupies slight depressions within large areas of Abilene clay loam and occasionally is covered with water for a day or so after heavy rains. Although the areas do not have free drainage, they are sufficiently well drained, and crops are not drowned out, and the extra amounts of water received as run-off from surrounding higher soils are beneficial.

Roscoe clay consists of very dark grayish-brown or nearly black compact crumbly clay to a depth of about 12 inches. The clay is very sticky and plastic when wet, and when dry it cracks to large clods which crumble under considerable pressure to fine angular grains. This material is rather difficult to cultivate, but when worked at the proper degree of moistness it assumes a very good tilth. Typically the topsoil is not calcareous. Between depths of 12 and 40 inches the soil material is dark grayish-brown calcareous compact clay which has more of a "joint clay" character. It breaks to cubelike fragments about three-fourths inch in diameter. Below a depth of 40 inches and continuing to a depth of 60 inches, the material is brownish-gray compact calcareous clay spotted with dark grayish-brown material. At a depth of about 5 feet below the surface, the soil is underlain by soft yellowish-white chalklike material which within a few feet merges below with less limy and less white material. In different locations there are considerable differences in the depth and thickness of the various soil layers, depending on the degree of drainage. In locations where the water stands for the longest times, the chalklike layer occurs at the greatest depth below the surface and the overlying soil layers are the thickest.

This soil is somewhat more productive than Abilene clay loam. It contains more organic matter, is more fertile, and in most places receives some extra water as run-off from other soils. It occurs in small bodies, most of which are too small for separate fields. They are included with and worked with fields consisting of Abilene clay loam. A few former lake beds, which have been partly drained through natural invasion by head draws, are occupied by this soil.

Abilene loam.—Abilene loam is the third most important soil in the county. It occupies 57 square miles, about 30 square miles of which are in cultivation. In crop adaptation and value the soil ranks about midway between Miles fine sandy loam and Abilene clay loam. It occupies a large part of the gently sloping land surrounding Snyder.

The topsoil of Abilene loam ranges from 7 to 10 inches in thickness. It consists of dark-brown friable noncalcareous loam. It grades downward into dark-brown calcareous friable or slightly compact light clay loam. At a depth of about 18 inches this material grades into brown or slightly reddish brown highly calcareous loam which rests on nearly white loamy chalklike material at a depth of about 30 inches. The quantity of carbonate of lime decreases downward from the top of the chalklike layer which ranges from 2 to 4 feet in thickness, and this, in turn, grades beneath into light-brown calcareous loam containing a few spots of white chalky carbonate of lime.

This soil is somewhat variable and as mapped includes small areas of more red, light, or dark variations. The range of total thickness of the layers overlying the chalklike layer is from 24 to 42 inches. The surface relief is gently rolling, the slope ranging between 0.5 and 3 percent.

This productive soil is in favor with the farmers. Many fields include a few spots of Potter loam. Crop yields over a period of years average about the same as on Miles fine sandy loam. The Abilene soil is slightly less drought resistant, but it is more fertile and less subject to blowing.

Miles loam.—Miles loam, locally known as "red loam" is agriculturally very similar to Abilene loam. It differs from the Abilene soil in the same way that all Miles soils differ from Abilene soils of like texture; namely, it is redder, the chalklike layer occurs at a greater depth below the surface and carbonate of lime occurs less abundantly in the upper soil layers.

The 4- to 10-inch topsoil consists of dark reddish-brown friable loam. It grades below into the upper part of the subsoil, which is dark reddish-brown rather friable clay loam extending downward to a depth of about 24 inches. These two upper soil layers do not contain carbonate of lime. The topsoil is cultivated readily to a fine crumblike tilth. Below plow depth the topsoil and upper subsoil layers break to large clods which, under moderate pressure, shatter to very fine clods or coarse granules. The dark color decreases with depth, and the color becomes reddish brown below a depth of 16 or 18 inches. Below a depth of about 24 inches the subsoil is reddish-brown sandy clay loam which changes to dull reddish-yellow calcareous loam from 8 to 12 inches above the top of the chalklike layer. The reddish-brown layer is calcareous in places. At an average depth of 4 feet beneath the surface (with a range from 3 to 5 feet) the soil

is underlain by a yellowish-white chalklike layer which ranges from 2 to 4 feet in thickness and grades downward into less limy dull reddish-yellow friable loam containing a few white spots of carbonate of lime.

This soil is productive and rather drought resistant. Yields, crop adaptation, agricultural characteristics, and farming value are practically the same as for Abilene loam. All layers are easily penetrated by plant roots and soil moisture. This is a rather inextensive soil with smooth surface relief, occurring in places where areas of Miles fine sandy loam grade into areas of heavy soils. About 65 percent of the land is in cultivation.

Roscoe loam.—Roscoe loam, locally known as "black loam", is an excellent though not extensive agricultural soil. It is darker than Abilene loam and occupies low flats and slight depressions, which receive some water as run-off from surrounding higher areas.

The topsoil is from 8 to 12 inches thick and consists of very dark brown or nearly black friable loam. This material rests on the upper subsoil layer of dark-brown rather friable and coarsely granular clay loam which extends downward to a depth of about 24 inches. This material, in turn, is underlain by brown compact clay which breaks into cubelike or "joint clay" fragments about three-fourths inch in diameter. This layer grades into a lower subsoil layer, ranging from 2 to 3 feet in thickness, of brownish-yellow rather friable fine sandy clay loam, and this rests on a chalky layer. From the surface to a depth ranging from about 3 to 4 feet, the upper soil layers do not contain carbonate of lime, but below that depth they are calcareous. At an average depth of about 6 feet, which depth varies widely depending on the degree of drainage, the soil is underlain by an almost white friable chalklike layer. The chalklike layer ranges from 2 to 4 feet in thickness and grades downward into less limy brownish-yellow loam or fine sandy clay loam, containing a few white spots of carbonate of lime.

This soil is somewhat more productive than Abilene loam. Though not freely drained, this condition is an asset in this region as the extra water received as run-off is absorbed by the soil and used by crops. Owing to the larger supply of moisture, the native grasses grow thickly and provide larger quantities of organic matter and nitrogen. The same crops are grown as on Abilene loam, and average yields are about one-fourth higher. Under normal moisture conditions of low rainfall and where no run-off water is obtained, this soil is considered more droughty than Roscoe fine sandy loam, owing to the compact slowly permeable subsoil layers which lie below a depth of 24 inches. About 65 percent of this soil is in cultivation.

Spur loam.—Spur loam is a dark-brown friable granular calcareous loam which becomes less dark with depth and grades below into light-brown friable cloddy loam at a depth of about 30 inches. It occupies stream bottoms subject to overflow at wide intervals—generally a year or more apart. When the overflows last long enough to thoroughly wet the soil they are very beneficial, as they supply a good store of moisture. Commonly they last only long enough to allow moisture penetration to a depth ranging from 1 to 2 feet. Little damage to cultivated crops is caused by overflows.

This soil is fertile, drought resistant, and productive. Crop yields average the same as or slightly higher than on Abilene loam or other smooth upland soils. When higher yields are obtained than on the adjacent smooth upland soils, they are generally due to the extra moisture obtained from overflow waters. Areas subject to rather frequent overflow and areas with the ground water lying less than 20 feet below the surface would probably produce alfalfa successfully. Certain areas, notably those in the bottoms of Deep Creek, are very rarely flooded. Since this soil consists of stream deposits largely unchanged except for some darkening and accumulation of organic matter in the surface soil, it is not uniform in texture or productiveness. In various places, sand, gravel, or clay strata occur at different depths. About 10 percent of this soil is in cultivation. The percentage in cultivation is low, on account of the labor required to clear off the rather heavy growth of mesquite brush.

Spur clay loam.—Spur clay loam to a depth of about 3 feet consists of dark-brown calcareous friable granular clay loam which grades downward into light-brown calcareous rather friable cloddy clay loam. This soil occupies stream bottoms subject to occasional overflow and differs from Spur loam only in texture. On account of the heavier texture it is somewhat more droughty.

Agriculturally this soil resembles Abilene clay loam. Yields average about the same or slightly higher on the Spur soil, vary to about the same extent between wet and dry years, and the same crops are grown. About 100 acres are devoted to the production of alfalfa under irrigation, and good yields are obtained where irrigation water is available. Only about 10 percent of the land is in cultivation, because of the labor required to clear it of brush. It is very good pasture land and furnishes considerably more grazing than most of the upland areas.

Spur fine sandy loam.—Spur fine sandy loam, to a depth of about 2 feet, consists of dark-brown mellow calcareous fine sandy loam which grades downward into light-brown mellow calcareous fine sandy loam. In places, layers of heavier material occur at various depths. The soil material in a few of the areas is not calcareous. This soil differs from the other Spur soils only in texture. It occupies stream bottoms subject to occasional overflow and is somewhat variable.

This soil is fertile, drought resistant, and productive. In agricultural characteristics it is very similar to Roscoe fine sandy loam. Yields, crops grown, and agricultural value are about the same. On account of its sandier character, it is somewhat more drought resistant than the heavier Spur soils. It is a very inextensive soil occurring mainly along small streams flowing through areas of Miles fine sandy loam. Because of the labor required to clear off the heavy growth of mesquite brush and because of the inconvenience of working the small tracts, only about 20 percent of the land is cultivated.

Miller loam.—Miller loam consists of dark reddish-brown or reddish-brown friable calcareous loam which becomes lighter colored with depth and, at a depth of about 2½ feet, grades downward into brownish-red calcareous friable loam. This soil is redder than Spur loam but otherwise is very similar.

This soil occurs in the very narrow areas of bottom lands adjacent to Colorado River and Rough Creek. It is a fertile drought-resistant soil and where cultivated produces good yields of crops. Together with large areas of nonagricultural land, it is held in large cattle ranches, and none of it is in cultivation. It furnishes excellent and abundant grazing.

The small areas adjacent to Rough Creek consist of reddish-brown calcareous very fine sandy loam underlain in most places by yellowish-red loamy fine sand at a depth of about 3 feet below the surface. Most of these areas are somewhat sloping, and parts of them lie above the level of overflows. They represent included areas of Yahola very fine sandy loam which, on account of their small extent, are mapped as Miller loam.

Miller clay loam.—Miller clay loam consists of dark reddish-brown calcareous clay loam which becomes lighter colored with depth and, at a depth of about 3 feet, changes to brownish-red calcareous clay loam. The 16-inch surface soil is friable and has good tilth, and accordingly it absorbs water rather readily. Below a depth of about 16 inches the material is rather compact. This soil differs from Spur clay loam only in that it is redder. So far as is known the two soils are identical in other characteristics and have the same value for farming. A few small areas, which are nearly clay in texture, are included in mapping.

This is a fertile and productive soil, although it is somewhat droughty. Following overflows, very good yields are obtained. When an extra supply of water has not been had from flood water, yields are somewhat higher than on Abilene clay loam. About 200 acres of this soil are in cultivation. On account of the amount of labor required to clear the heavy growth of mesquite brush, preparatory to placing the land in cultivation, and because of the occurrence of this soil surrounded by large areas of nonagricultural land its use for crops has been limited. It occurs only in the narrow bottom lands along Colorado River and Bull Creek. Most of the land is occasionally overflowed.

FAIR AND POOR CROP SOILS

The soils included in the group of fair and poor crop soils, although differing widely in such soil features as texture, color, and depth, have the following characteristics in common: They are all less productive and less suitable for cropping than are the good crop soils. They have a rather wide range of suitability for crop production—from fairly good to poor—and they have widely diversified soil characteristics ranging from very drought resistant sands to very droughty clay, and from shallow eroded soils occupying knolls to filled-in poorly drained soils occupying lake beds. The group includes three main kinds of soils—shallow soils, very sandy soils, and poorly drained soils. The shallow soils are Abilene clay loam, shallow phase, Valera clay loam, Vernon clay loam, Potter loam, Potter fine sandy loam, and Miles fine sandy loam, shallow phase. Miles fine sand and Miles fine sand, shallow phase, comprise the very sandy soils. Randall clay is the only poorly drained soil of the group.

Abilene clay loam, shallow phase.—Abilene clay loam, shallow phase, comprises shallow areas of Abilene clay loam, wherein the soil material over the chalklike layer is less than 2 feet thick. Most areas of this soil occupy moderate slopes ranging from 3 to 5 percent gradient. Erosion has occurred to sufficient extent to prevent a thick accumulation of soil. The color of this shallow soil is somewhat less dark than that of typical Abilene clay loam, and all the soil layers are thinner. Naturally the soil is less fertile than typical Abilene clay loam, and crop yields are lower.

The topsoil, consisting of dark-brown calcareous rather friable clay loam, ranges between 8 and 14 inches in thickness. The material breaks out as large clods when dry, and under moderate pressure the clods crumble to very fine clods or coarse granules. When cultivated, the material readily assumes a fine crumblike tilth and, considering that it is a clay loam, works with comparative ease. The topsoil grades downward into brown highly calcareous rather friable clay loam. At a depth ranging between 14 and 24 inches, the soil is underlain by a friable almost white chalklike layer consisting of a mixture of carbonate of lime (pl. 1, *A*) and light-brown clay loam. From the top of the chalklike layer downward the content of carbonate of lime slowly decreases, and from 2 to 3 feet beneath the top of the layer, the material grades into light-brown calcareous friable clay containing a few white spots of lime.

Owing to its lower fertility, less thickness of soil material, and greater slope, this soil is not so valuable for farming as is Abilene clay loam. About 15 percent of the land is in cultivation, which is about one-fourth of the proportion of Abilene clay loam in cultivation. The same crops are grown as on the typical soil, but yields probably average about one-fourth lower. This soil is subject to rather severe erosion in cultivated fields. Terracing and contour cultivation reduce this injury. Where erosion is not checked with terraces, the fields become considerably less productive within a few years.

This soil is moderately extensive. The largest areas are in the vicinity of Dermott (pl. 1, *B*) and a few miles southwest of Snyder. A narrow rather continuous strip of moderately sloping land along the margins of the Roscoe Divide, where the flat surface characteristic of the divide grades toward sharply sloping surfaces, is composed of this soil.

Vernon clay loam.—Vernon clay loam, locally known as "red clay", is an extensive soil occupying 66.9 square miles in Scurry County. It occurs most extensively in the central-northern and southwestern parts. These localities are dominated by moderately sloping surface relief, where erosion has been rather active. Vernon clay loam occupies a large part of these sections and dominates the soil character and agriculture. Since this soil is not well adapted to crop production, the areas are held in large cattle ranches and most of the land is used for grazing.

The 18-inch topsoil of Vernon clay loam consists of dull reddish-brown calcareous heavy clay loam which contains a few hard lumps of carbonate of lime. The material in this layer breaks to large rather hard clods. When cultivated at the proper degree of moistness, the soil works to a fine crumblike tilth. It is sticky when

wet and hard when very dry. The topsoil grades downward into pale brownish-red friable clay loam spotted with white hard and soft lumps of carbonate of lime, which make up about one-fourth of the total mass. This layer corresponds to the more fully developed chalklike layer which occurs at greater depths below the other important smooth soils. With increased depth the white lumps of carbonate of lime become less abundant, and, at a depth of about 3 feet, the material merges into less friable and more compact slightly calcareous joint clay or shaly clay. The color of this lowest layer ranges from dark red where it is a joint clay, to pale red where it is a rather sandy shaly clay, and the layer includes bands of white, yellow, or variously colored materials. This lowest layer is slightly modified geological material which, in the northeastern corner of the county, includes bands of gypsum.

Vernon clay loam is redder and less dark than Abilene clay loam, shallow phase. The two soils are underlain at slight depths by geological materials of different character. That underlying Vernon clay loam is redder and has imparted a redder color to the developed soil. It is also more compact and impermeable and causes the overlying soil to be somewhat more droughty. Both soils are heavy textured, shallow, sloping, and moderately eroded. They are rather similar in both soil and agricultural characteristics.

Characteristically Vernon clay loam is a droughty soil. On account of its heavy texture and sloping surface relief, a rather large proportion of the rainfall is lost through run-off and evaporation. The soil is also rather low in fertility, and yields are not very high, even during years of good moisture conditions. The topsoil has been continuously slowly washing away as it has formed, the soil is not deep, and there has not been so large an accumulation of organic matter as in such smooth heavy soils as Abilene clay loam. Yields average considerably less, probably more than one-fourth less, than on Abilene clay loam. For best results in cultivation this soil needs terracing. About 10 percent of the land is in cultivation, and probably most of it should remain in grass for grazing range livestock, a use to which it is naturally adapted.

Valera clay loam.—Valera clay loam is very similar to Abilene clay loam, shallow phase. It differs in that it is underlain by a layer of carbonate of lime accumulation, which has hardened into stone, or "caliche", and rests on hard sedimentary limestone, instead of a chalklike layer resting on friable clay which underlies Abilene clay loam, shallow phase. In addition it has a more pronounced chocolate color and contains less lime in the topmost foot of soil. So far as could be learned from farmers' observations and the appearances of crops during the course of this survey, the two soils have approximately the same value and characteristics for producing crops.

The topsoil, to a depth of about 12 inches, contains no carbonate of lime. It is dark reddish-brown or chocolate-brown friable heavy clay loam which breaks readily when dry to very fine rounded clods or coarse granules about one-eighth inch in diameter. The granular structure is more pronounced in this soil than in any other in the county. It causes the material to be more readily permeable to moisture, plant roots, and air, and imparts to the soil some of the characteristics of a somewhat sandier soil. Below a depth of about 12 inches the soil material consists of brown or reddish-brown cal-

careous compact clay which has a more "joint clay" character. It breaks out as cubelike fragments about three-fourths inch in diameter. At a depth ranging from 16 to 20 inches the material is abruptly underlain by white "caliche", or accumulated carbonate of lime, which is hard and stonelike. The caliche is several feet thick and rests on hard white sedimentary limestone. As seen on cliff outcrops, a few plant roots penetrate the caliche.

This soil is very inextensive. It occurs in the extreme northwestern corner of the county on the northern edge of the Fluvanna Flat and, with Valera stony loam, occupies the highest part of the county. Not more than one-half square mile is in cultivation. The soil is used for the production of cotton and sorghums. It is excellent grazing land and supports a good growth of grasses. It is characterized by smooth gently sloping surface relief and has not been subject to so much erosion as Abilene clay loam, shallow phase. The soil material is shallow because it has been formed from hard limestone.

Potter loam.—Potter loam, locally known as "chalky land" or "white loam", occurs as small eroded knolls and slopes widely scattered throughout the county. The largest areas occupy the sharp slopes leading down from the Roscoe Divide and Fluvanna Flat. Approximately 3 square miles of this soil are in cultivation. It is very shallow, and the underlying chalklike layer is reached by the plow and brought to the surface in many places, causing cultivated fields to have a nearly white appearance.

This soil ranges from 6 to 16 inches in thickness over the lime or chalklike layer. To a depth within about 5 inches of the chalklike layer the soil material is brown friable granular highly calcareous loam. The lower 5 inches of the soil material consists of light-brown friable loam containing white films of lime along all the crevices. The material of these two layers crumbles readily to a mixture of fine powder and fine grains, and when cultivated it works easily. This soil may be worked throughout a wide range of moisture conditions and assumes an excellent tilth. In very shallow spots, the surface soil is grayish brown. The upper few inches of the chalklike layer are hard, stonelike, and form a caliche, or lime hardpan, but below this the lime layer is chalklike and friable. The lime layer ranges widely in thickness, from 1 foot to 6 feet. It grades downward into friable light-brown calcareous loam containing less lime. In a few severely eroded areas, the lime layer is not present as a characteristically nearly white layer but is marked by a few white lumps of lime and white films of lime along soil crevices.

This soil is shallow, low in fertility, and subject to severe erosion. Crop yields are low during both good and dry years. The average yields are about one-half as high as those obtained on such good soils as Miles fine sandy loam or Abilene clay loam. Choice of crops is the same as on the good crop soils, though possibly a slightly smaller percentage of the land is devoted to cotton. Some farmers grow cotton, the crop which requires the greatest labor expenditure, on the more productive soils, and they utilize such very shallow soils as Potter loam for growing feedstuffs. So far as possible they have laid out their fields in such manner that this soil is utilized for small farm pastures. The topsoil has been washed off about as fast as it has formed. As there has been no opportunity

for much accumulation of organic matter, the soil is rather low in nitrogen. Most of this land has a slope of more than 5 percent, and where cultivated it requires terracing.

A peculiar characteristic of this and the other Potter soils is that during dry periods crops will stay green and continue growing to some extent after similar crops have dried on the deeper good crop soils. The yields obtained during very dry years average about the same as on Miles fine sandy loam and somewhat higher than on Abilene clay loam. The fertility of these soils is so low that crops make a slow and small growth. Even during moderately dry years there is practically as much available moisture as available plant nutrients, and yields are not materially reduced. This type of drought resistance is not very valuable. It merely means that low yields are obtained at all times, during both wet and dry years.

Potter fine sandy loam.—Potter fine sandy loam is very similar to Potter loam, but it is somewhat sandier. It is more likely to blow, but otherwise the differences between the two soils have virtually no agricultural significance. This is a very inextensive soil. Not more than 10 percent of it is in cultivation, and that consists largely of small areas included in fields of better soils. Yields are low during both dry and wet years, and the soil is not well suited for crop production. To a large extent it is utilized in small farm pastures. It occurs in the same positions as Potter loam but in general is confined to localities in which sandy soils occur.

Potter fine sandy loam consists of about a 10-inch layer of brown highly calcareous mellow fine sandy loam overlying light-brown highly calcareous fine sandy loam, and this, in turn, overlying white chalklike material at a depth ranging from 12 to 20 inches below the surface. In places the upper few inches of the chalklike layer are hard and stonelike, forming a caliche. Cultivated fields contain nearly white spots, in which the underlying caliche, or chalklike material, has been plowed up. The soil supports a thin growth of native grasses.

Miles fine sandy loam, shallow phase.—The shallow phase of Miles fine sandy loam is underlain by sandstone rock at a depth ranging from 1 to 2 feet below the surface. It is somewhat more sloping than typical Miles fine sandy loam. It is not so strong as the typical soil, and in many small spots the sandstone lies so close to the surface that it interferes with cultivation. This soil is very inextensive. It occupies small knolls and sharper slopes within large areas of typical Miles fine sandy loam.

Miles fine sandy loam, shallow phase, consists of a 10-inch layer of reddish-brown mellow fine sandy loam overlying brownish-red friable sandy clay loam which extends downward to a depth within a few inches of the underlying sandstone. The upper two layers do not contain carbonate of lime. They rest on a layer of highly calcareous sandy yellowish-white friable chalklike material, from 1 to 4 inches thick, which rests on sandstone lying at a depth ranging from 10 to 36 inches below the surface and averaging about 18 inches below. In places the chalklike layer is not present as a distinct layer but is represented by white crusts of lime coating the top of and crevices within the sandstone.

This soil is somewhat eroded and accordingly variable. As mapped it includes some areas of Potter fine sandy loam and its deep

phase. In some small spots the soil material is shallow over the chalklike material and is not underlain by sandstone.

About 30 percent of the land is in cultivation. So far as practical, farmers have selected deeper soils for crop land and kept this soil for pasture. On account of its distribution, small included areas are in cultivation within fields consisting largely of typical Miles fine sandy loam. In general, the shallow soil has the farming characteristics of the typical soil but is less productive. Yields range from one-fourth to one-half lower. Where cultivated the same crops are grown as on the good crop soils. All areas of this soil in cultivation should be terraced.

Miles fine sand.—Miles fine sand and its shallow phase are both known as "shinnery sand", on account of the characteristic vegetation consisting largely of dwarfed shin oak brush, together with small quantities of sand sage and little bluestem and minor amounts of many other plants. Together, these two soils constitute a distinct subgroup of very sandy soils which have characteristics dissimilar to those of all other soils of the county. They support a somewhat different type of agriculture, the native vegetation was different, and the cultural practices followed are different. They occupy an unbroken area south of Ira, which includes no other soils. Miles fine sand comprises 9.4 square miles and the shallow phase 2.8 square miles.

Whereas on the other soils of the county the farmers' chief concern is the saving and proper utilization of all the moisture possible, on these soils the problem is the prevention of soil blowing and obtaining stands of crops. On the other soils only the most drought-resistant crops—cotton and sorghum—are grown. On these soils corn, a crop which is less able to withstand dry hot spells but of which good stands are more readily obtained, is of considerable importance. About 40 percent of the total cultivated area of these soils is used for sorghums, 30 percent for cotton, and 25 percent for corn. The very sandy soils are very drought resistant, rather low in fertility, and later than the heavier soils. No water runs off the surface. It quickly sinks sufficiently deep into the soil that very little is lost through evaporation, and nearly all is conserved for plant growth. Consequently the soil character partly corrects the lack of climatic adaptation for corn, and the yields of corn approach those of the grain sorghums. Corn makes a larger and more rapid early growth and more quickly reaches a stage where it will protect the soil from blowing. Cotton makes a very slow early growth, it is easily injured or destroyed by drifting sand, and it is therefore grown more on heavier soils. The dead cotton plants left after harvest are not a thick enough covering adequately to protect the soil from blowing during the winter, and when turned under they do not return much binding material to the soil. Cotton is commonly grown only on new ground, which still contains some of the shin oak roots, or follows grain sorghums or corn. The sorghums are the most popular crops because they are the highest yielding. In general only those varieties are grown which are headed, leaving the stalks in the field to prevent soil blowing during the winter and to be turned under in the spring, thereby adding organic matter and binding material to the soil. These soils are late, and plantings are delayed about 2 weeks after the time common for the heavier soils.

In part this is done in order to delay planting until after the most windy season, but in addition these soils are cold and crops do not thrive on them during cool weather. Land of this kind does not require terracing.

Miles fine sand consists of a 3- to 4-foot layer of loose fine sand overlying a subsoil of red friable sandy clay loam. In native pastures which have been plowed the upper 6 inches of topsoil is brown. Below this, and continuing to a depth of about 2 feet, it is pale brownish yellow, and from that depth to the clay loam subsoil it is light reddish yellow. In dry cultivated fields the soil appears almost white, especially following blowing. The light color indicates a low content of organic matter. The topsoil contains no carbonate of lime, and the change to the subsoil is abrupt. The upper subsoil layer consists of yellowish-red friable sandy clay loam, and at a depth of about 6 feet below the surface it merges with reddish-yellow friable fine sandy clay loam or loam. The soil material is underlain, at a depth of about 10 feet below the surface, by almost white sandy chalklike material which grades downward into less limy material. Carbonate of lime is not present in the soil layers to a depth within a few inches of the chalklike layer. There are a very few fine waterworn gravel on the surface and throughout all the soil layers.

This soil is low in fertility, and yields on old land are smaller than on new land. Small applications of commercial fertilizer might prove beneficial on old fields. Where good stands of crops are obtained, yields average about the same as on Miles fine sandy loam. They are higher than on that soil during dry years and lower during good years. Corn yields at least twice as much as on Miles fine sandy loam. For a few years after breaking, this soil is sufficiently productive to be classed as a good crop soil, but after that, even when handled in the best possible manner, it blows very badly, and it is very difficult to obtain stands of crops. About 1 square mile is in cultivation. Living conditions on this land are very disagreeable during windy weather.

The soil furnishes a different type of grazing than that on the heavier land, and it offers a moderate amount of grazing during both wet and dry years. A large part of the grazing consists of browsing on shin oak, but at a certain time during the spring, shin oak is poisonous to livestock. The native grasses are mainly bluestems and other coarse bunch grasses.

Miles fine sand, shallow phase.—Miles fine sand, shallow phase, consists of areas of Miles fine sand, in which the red clay loam subsoil lies from 1 to 2½ feet below the surface. It is a slightly better agricultural soil than typical Miles fine sand, as there is a little more fine material in the topsoil and it is slightly less subject to blowing. Except for the difference in the thickness of the sand surface layer, the two soils are identical. In many places this soil can be improved by very deep plowing to bring some of the heavier subsoil up to the surface. Only about 1,300 acres are in cultivation.

Randall clay.—Randall clay, locally known as "lake beds", is the only poorly drained soil in Scurry County. It occupies intermittent lake beds which have no outlet and for which there is little possibility of drainage. Nearly all the areas occur on the Roscoe Divide and on the Fluvanna Flat. During wet years they may be covered with

water to a depth of a foot or so for a month or more. In addition to being poorly drained, this soil is naturally infested with a bad weed pest, the blueweed, and the heavy soil is very difficult to cultivate. Not more than 100 acres are in cultivation.

Randall clay consists of dark-gray or bluish-gray extremely heavy plastic compact clay which becomes slightly lighter colored with depth. Below a depth of about 5 feet the material merges with grayish-yellow compact clay. Typically, to a depth of a foot or more, the soil contains no carbonate of lime, and below that depth it is highly calcareous. Many areas are calcareous to the surface. So far as is known there is no chalklike layer underlying this soil. Chemical analyses. (*4*) of samples of this soil, collected from nearby counties, indicate that it is not so fertile as Abilene clay loam.

The most practical method of reclaiming this soil is to prevent excess water from collecting in the lakes by keeping run-off water from higher areas on the surrounding fields. By terracing and contour cultivation on the sloping areas this can be accomplished. On account of its very heavy texture, the soil is droughty and is cultivated with difficulty even when it receives no run-off water. For the most part, land of this kind can best be used as pasture, for which it has a slightly higher value than such good crop soils as Abilene clay loam.

SOILS UNSUITABLE FOR FARMING

This group includes those soils which, because of rough topography, stoniness, or extreme droughtiness, are entirely unsuitable for crop land. The greater parts of these are held within large ranches, and they support a different type of agriculture from the cotton farming common to the good soils of the county. They occur most extensively in the northern and northeastern parts and cause those sections to be ranching territory. They are utilized for grazing purposes and should continue to be so utilized. The group includes Potter gravelly loam, Valera stony loam, Vernon clay, Weymouth very fine sandy loam, eroded phase, and rough broken and stony land.

Potter gravelly loam.—Potter gravelly loam is very gravelly soil underlain by caliche at a very slight depth. It occupies moderate or sharp slopes and occurs in both large and small areas scattered throughout the rolling sections of the county. It consists of a 4- to 10-inch layer of brown or grayish-brown highly calcareous friable loam resting on caliche, a hard white stonelike layer, or hardpan, of accumulated carbonate of lime. The caliche is several feet thick and rests on beds of gravel, clays, or sands. Large and small gravel are abundantly strewn over the surface and throughout the surface soil. In the larger areas the gravel consists largely of water-worn material, but in the small areas it is largely small caliche fragments and is less abundant on the surface.

The small areas on the Roscoe Divide and the Fluvanna Flat have dark-brown surface soils, occupy slight knolls, and contain comparatively little gravel which consist exclusively of caliche fragments scattered over the surface and in the soil. A few small spots of this soil are included within cultivated fields occupied primarily

by better soils. Crops grow on such spots much like on Potter loam, though yields are somewhat less. Nearly all of this soil is used as grazing land, and it is good for that purpose.

Valera stony loam.—Valera stony loam is very similar to Potter gravelly loam, but it is underlain by limestone beneath the caliche. It occupies smooth or moderate slopes and occurs on the northern edge of the Fluvanna Flat (pl. 1, *C*). It is characterized by a 4- to 10-inch layer of brown or dark-brown friable calcareous loam or clay loam overlying caliche. Irregular fragments of caliche are strewn over the surface and throughout the surface soil. The caliche bed is several feet thick and rests on hard sedimentary limestone. All this land is used for pasture, and it supports a good growth of needlegrasses, grama, mesquite brush, a few cedar shrubs, some live oak brush, and many other plants. It is good grazing land.

Vernon clay.—Vernon clay, locally known as "red clay", is more droughty, heavier, and commonly more severely eroded than Vernon clay loam. It is so droughty that farming is not successful on it, and not more than 1 percent is in cultivation. Buffalo grass, locally known as "mesquite grass", and other sod-forming grasses do not thrive well on it, and the native vegetation is mainly a rather sparse growth of the coarse rather unpalatable tobosa grass, locally known as "buffalo grass." Therefore, in addition to this soil being unsuitable for farm land, it has rather low value as grazing land.

The 6- to 8-inch surface soil consists of reddish-brown or dark reddish-brown compact calcareous clay. When very dry the topmost inch of the surface soil crumbles to fine grains less than one-eighth inch in diameter, and the material below breaks out as large hard clods which, under considerable pressure, shatter further to very fine clods. The surface layer grades downward into brownish-red or dark-red calcareous plastic clay containing a very few lumps of white carbonate of lime. This second layer is very compact and has a "joint clay" character. It breaks out as small cubelike fragments which are extremely hard and about three-fourths inch in diameter. At a depth ranging from 2 to 3 feet, the material in the second layer grades imperceptibly into largely unweathered slightly calcareous geological "joint clay" or shaly clay. This lowest layer is dominantly deep red or purplish red, streaked with bands of white, yellow, or variously colored material.

This soil is unsuitable for farming purposes. It is and should continue to be used as grazing land. It occurs in association with Vernon clay loam, and most of it is held in large cattle ranches.

Weymouth very fine sandy loam, eroded phase.—For all practical purposes, Weymouth very fine sandy loam, eroded phase, is the same as rough broken and stony land, although the surface is not sufficiently rough to be included in that classification. It consists of areas underlain by red sandy shaly clay geological deposits, in places where sheet erosion rather than gullying has been very active. The vegetation is very sparse, and the land has rather low value for grazing. Commonly there is very little soil material, as it is washed off as fast as it forms. Where present, it consists of light-red calcareous mellow very fine sandy loam containing a few hard lumps of white carbonate of lime. There is some slight darkening of the surface soil in the smoothest and least eroded spots. The area

mapped as this soil includes a number of gypsum outcrops which support virtually no vegetation and have no soil covering other than a slightly darkened somewhat hard crust about one-eighth inch thick. This soil occurs only in the northeastern corner of the county and is all used as grazing land.

Rough broken and stony land.—Rough broken and stony land includes cliffs, rock outcrops, and rough, severely eroded, or gullied areas, some of which have large quantities of stone scattered over the surface. It includes the badland country in the northeastern corner of the county and many smaller areas. The vegetation varies but in general consists largely of various grama grasses, needlegrasses, mesquite brush, catclaw, weeds, and other grasses. The more stony areas support a rather sparse growth of grasses, woody shrubs, and various other plants. Some of this land furnishes but scant grazing, but in other places grazing is good.

RECOMMENDATIONS FOR IMPROVEMENT IN THE UTILIZATION OF SCURRY COUNTY SOILS

The most important recommendation regarding the utilization of the soils of Scurry County is to select only the more productive soils for crop land and to continue utilizing the less productive soils as grazing land. In general this practice has been followed to date, although there is some land in cultivation that should never have been plowed. Until economic conditions change materially, future increase in the amount of cultivated land should be limited to the good crop soils.

Terracing and running rows on a water level offers the greatest opportunity for the improvement of cultural practices. Experimental results at Spur (*2*) and practical trials by farmers clearly show that on most soils terracing materially increases crop yields, checks erosion, and is good farming practice. The very sandy soils and the smoother areas of Miles loamy fine sand will probably not be benefited by terracing. On the more nearly level areas of Abilene clay loam, running the rows on a water level appears sufficient to prevent nearly all loss of water as run-off without the construction of terraces. In this section, level terraces have generally given the best results and are recommended for general practice. In certain fields, which consist of rather steeply sloping heavy soils or which receive considerable quantities of run-off water from outside areas, the terraces may need some fall in order to prevent breaking.

Tillage operations should be such as to best conserve and utilize soil moisture. In practice, if the land is kept weed free at all times during the year and in such condition that it does not blow excessively, the essentials of good tillage are fulfilled. Listing and plowing are about equally effective methods of seed-bed preparation. An occasional deep plowing every 3 or 4 years is beneficial. Fallowing in alternate years and growing green-manure crops to be turned under are in general not economical practices. Applications of commercial fertilizers will not give increased yields in most cases. When properly applied, applications of barnyard manure are beneficial, and the manure should be conserved, but it is not generally saved. It should be spread very thinly as early in the fall as possible. It

is best utilized on land which will be used for forage crops, such as Sudan grass or sorgo, the following year.

Three agricultural experiment stations are situated in nearby localities, on which farming problems are intensively studied. The results at Big Spring and Lubbock are directly applicable to the loams and sandier soils, and the results at Spur are applicable to the clay loams and heavier soils. For detailed information on the results of these experiments, which are published in Texas Agricultural Experiment Station Bulletins and others (*1*, *2*, *5*, *6*, *7*), the local county agent or the extension service of the Agricultural and Mechanical College of Texas should be consulted.

SOILS AND THEIR INTERPRETATION

Scurry County is in the southern part of the Great Plains area of the United States, where the climate has favored a rather heavy growth of short grasses and rather rapid decomposition of organic material. The influence of the grass vegetation is shown in the comparatively dark color of the soils, which, however, is not so dark as that of soils developed under similar vegetative and moisture conditions in regions farther north, where the climate is cooler. The color of the surface soil of the clay loams is dark brown or chocolate brown, of the fine sandy loams is reddish brown, and of the fine sands is light brown. In all except the fine sands, the darkest colored layer is about 16 inches thick, and there is some darkening of the soil material to a depth of about 3 feet.

The dark color is imparted by finely divided organic matter derived from the decay of grass roots or other plant remains and mixed with the mineral constituents. The organic matter is rather evenly distributed throughout the soil, but it is slightly more abundant on the surfaces of structure particles than in their interiors. The content of organic matter gradually decreases with depth. By calculating organic matter as 20 times the nitrogen content, chemical analyses of samples of soil collected from nearby counties (*3*, *4*) indicate that the content of organic matter of clay loams is approximately 2 percent in the soil material to a depth of 7 inches and 1.5 percent between depths of 7 and 19 inches. Comparable fine sandy loams contain approximately 1.5 percent in the 7-inch layer and 1.4 percent between depths of 7 and 19 inches. The indicated content in different samples of the same soil ranges between one-third more and one-third less than these averages. The analyses of a single set of samples of fine sand indicate that it contains about 0.6 percent organic matter in the topmost 7 inches and 0.2 percent between depths of 7 and 19 inches. The indicated difference in the rate of decrease in content of organic matter with depth between the fine sandy loams and the clay loams is caused by the fine sandy loams being underlain by distinctly heavier textured subsoils, whereas the clay loams are not. The color change is about the same and, presumably from the top of the subsoil down, the content of organic matter decreases in the fine sandy loams at about the same rate as in the clay loams. Similarly the content of organic matter is probably somewhat higher in the top of the clay loam subsoil, which underlies Miles fine sand at a depth of about 3 feet, than in the lower part of the fine sand topsoil.

All the soils of this county, with the exceptions of extremely eroded, recently deposited, or poorly drained soils, are underlain by a zone of accumulation of calcium carbonate. Normally the layer is friable, yellowish white, and from 1 to 5 feet thick, depending on the lime content of the parent rock. In soils occupying smooth normally drained surface relief, it underlies the clay loams at a depth ranging from 3 to 4 feet, the fine sandy loams at a depth ranging from 4 to 8 feet, and the fine sands at a depth of about 10 feet. The annual rainfall of the area (about 21 inches) has not been sufficient to leach the carbonates entirely out of the soil, but it has dissolved them out of the upper layers, carried them down, and deposited them at the normal depth of moisture penetration. No, or at least only small quantities, of water leach down through the soil and substrata to the ground-water table which lies from 100 to 300 feet below the surface. The bases have not been leached out, and the soil has a neutral or basic reaction.

The well-developed medium- and light-textured soils have a distinctly lighter textured sandy surface soil, a heavier textured upper subsoil layer, and a medium-textured lower subsoil layer. There has been considerable, though not extreme, translocation of the fine soil particles out of the surface soil to a lower horizon. In addition the subsoils are distinctly tinged with red, irrespective of the color of the parent material, the red color being most intense in the upper part of the subsoil. In the clay loams, the texture profile and the developed red soil color are not marked.

In all except the very sandy soils the surface soil, to a depth of 16 inches, has a faintly or moderately well-developed granular structure, the granules being about one-eighth inch in diameter, almost round to subangular in shape, and coated with a film of darker colored material. Below that depth the material breaks out as large irregular friable clods.

The soil characteristics mentioned are the result of the climate and especially of the vegetation under which the soils are developed. They constitute the normal or regional soil profile. They are not possessed to the same degree by all the soils mapped. Eroded soils, abnormally drained soils, soils developing on recently deposited materials, and soils developing on resistant parent materials do not exhibit all of them in well-developed normal form. Such differences in the degree of expression of the regional soil profile, together with differences inherited from the parent rocks, which have been more or less obliterated by soil-forming processes, constitute the bases for the separation of soils into series. The normal and fully developed regional soil profile is best expressed in the medium-textured soils of the Miles series. To slightly less extent, or in a slightly abnormal form, it is represented by the other Miles soils, the Abilene soils, and Valera clay loam. The other soils of the county have not received the full imprint of their climatic and vegetative environment. They are incompletely or abnormally developed.

The characteristics of the Miles soils, which are most typically expressed in the fine sandy loam, are those of the normal red-tinted rather sandy Chernozem of a warm climate. In the fine sand, the surface material is so coarse textured that granular structure has not developed. In Miles clay loam the material below a depth of about 20 inches has a slightly compact and blocky structure, identical

with that of the Abilene soils, which is an indication of slightly abnormal development. In most places the red color of Miles clay loam, which is the chief observable characteristic differentiating it from Abilene clay loam, is a color inherited from a red parent material and is not a developed soil characteristic. In other places the red color is a developed soil color and is due to slightly sandier texture.

The Abilene soils are fully developed soils, and they have developed from unconsolidated highly calcareous friable fine-textured parent materials. They constitute the dominant kind of soil development in heavy-textured soils in this area. They indicate nearly normal development, differing from it in the somewhat, though not extremely, compact and blocky structure of the materials below a depth of about 18 inches. The granular and most intensely dark colored layer is 16 or 18 inches thick, but there is some dark color and organic matter present in all layers above the zone of carbonate accumulation.

Valera clay loam is a normal and well-developed soil. The parent rock, a nearly pure hard sedimentary limestone, weathers slowly, and this soil is not so deep as the well-developed soils derived from unconsolidated materials. Except that it is somewhat shallow, the regional soil characteristics are well expressed in this soil. It is developed in smooth normally drained areas where there has not been much erosion. The granular structure of the surface soil is better developed than in any other soil in the county. This soil is more red than Abilene clay loam and about the same color as Miles clay loam. Valera stony loam is an eroded immature soil similar to Potter gravelly loam.

The Potter soils are eroded shallow soils developed on friable unconsolidated parent materials which were not distinctly red. These soils are brown or grayish brown, and the dark-colored layer is thin and is granular below the platy layer which lies on the immediate surface. In most areas of these soils the material in the underlying zone of carbonate of lime accumulation is not indurated, or is only slightly so, but in the very shallow areas, which constitute Potter gravelly loam, the material in this zone is indurated to a caliche.

The Vernon and Weymouth soils are shallow eroded soils developed on unconsolidated parent materials which were distinctly red. They have inherited the red color of the parent material and are reddish brown. In the dominant type, the clay loam, the material to a depth of 1 inch from the surface is platy; below that and continuing to a depth ranging from 8 to 12 inches the material is fine cloddy; below that the material is cloddy and compact, and the zone of carbonate accumulation is friable; and the underlying parent material is compact cloddy. In none of the horizons do the structure fragments have very varnished or slick-appearing surfaces. In Weymouth very fine sandy loam, all the layers are friable and the structure profile is developing normally, as in Miles fine sandy loam, although it is not so fully developed. In Vernon clay the material is compact and cloddy from the surface down. There are a very few small slick spots in the clay and clay loam, but these are not typical. Most of the parent materials from which these Vernon and Weymouth soils have developed were only slightly calcareous, and

accordingly the zone of carbonate accumulation is not so thick or so strikingly developed as in most of the other soils. A definite zone is not distinguishable in most areas of Vernon clay, but it is fairly well developed in the Weymouth soils. The difference between the Vernon and Weymouth soils is one of structure and consistence. The Vernon soils are compact and not granular; the Weymouth soils are friable, and granulation, though incomplete, is of the normal type.

The Roscoe soils are abnormally drained and are very similar to the Richfield soils of other parts of Texas. The Roscoe soils occupy locations which receive some extra water as run-off from higher areas. However, the soil material is not saturated for a great length of time, is well aerated, and is well drained. On account of the greater moisture supply, these soils originally supported a heavier plant growth than the Abilene soils, accumulated a greater supply of organic matter, assumed a darker color, and the zone of carbonate accumulation formed at a greater depth below the surface. In Roscoe clay the surface layer is not well granulated, and the material, to a depth of about 12 inches, breaks out as small rather angular fragments ranging to one-fourth inch in diameter. Below a depth of 12 inches and continuing to the zone of carbonate accumulation, the material is compact and has a cuboidal or blocky structure, and the surfaces of the structural fragments appear varnished and slick. In Roscoe loam and Roscoe fine sandy loam the 18-inch surface soil is well granulated, and it overlies a compact blocky cuboidal subsoil.

The Randall soils are poorly drained. They are covered with water for considerable periods, and the ground color is gray or bluish gray rather than brown. The material in all layers is extremely compact and plastic and breaks out as intractable large clods.

The Spur and Miller soils are derived from stream deposits which are so recent that comparatively little soil development has taken place. There has been some accumulation of organic matter on the surface, and in most places the surface soil, to a depth ranging from 12 to 18 inches, is slightly or moderately granular. Commonly, white films of lime coat all soil crevices and former root channels in the material below a depth of about 2 feet, indicating that a zone of carbonate accumulation is beginning to form.

In Scurry County geological deposits of four different ages, Tertiary, Cretaceous, Triassic, and Permian, are exposed, and they have furnished the parent materials which have weathered into materials from which the soils have developed. In addition to these, the flood lands along streams are covered with very recent deposits. The Tertiary deposits, commonly known as the High Plains deposits, consist, in the upper part, of uniform unconsolidated highly calcareous dull-yellow friable clay and silt, and in the lower part they consist of similar material interbedded with sands and water-worn gravel. These deposits were laid down as a great outwash plain. They cover the Roscoe Divide, the Fluvanna Flat, a rim of territory surrounding these two sections, and some smaller areas. The Cretaceous deposit consists of rather pure hard fossiliferous limestone. It is confined to the north edge of Fluvanna Flat and the top of Flat Top Mountain. The Triassic deposit is variable, but

dominantly it consists of red calcareous joint clays containing numerous flakes of biotite or light-brown calcareous sands. Locally it contains ledges of weakly bound sandstone or beds of gravel. It is a fresh-water deposit and occupies the greater part of the county. The Permian deposit consists of red slightly calcareous shaly clays and sandy clays, with strata of gypsum. It occurs only in the northeastern corner of the county.

In this survey the soils have not been separated according to the geological age and character of the parent material. In different places the Miles soils and the Abilene soils have been derived from parent materials of Tertiary, Triassic, and Permian ages. Certain soil characteristics are associated with derivation of the soil from certain geological deposits, but the classification of the soil is based on its inherent features and not on those of the parent material. The Valera soils, which are characterized by a comparatively shallow indurated zone of carbonate accumulation, are confined to and occupy nearly all the outcrop of the Cretaceous limestone. Similarly, the Vernon soils which are eroded and have a red color inherited from the parent material are confined to outcrops of Triassic and Permian deposits.

Following is a description of a profile of Miles fine sandy loam, as observed 13 miles south of Snyder, one-fourth mile east of the northwest corner of survey 135, H. & G. N., block 3. The area occupies a smooth eastward slope of about 2 percent gradient. It is under virgin sod consisting of about one-half buffalo grass, one-fourth blue grama, with minor quantities of needlegrasses, various weeds including several annual legumes, mesquite brush, and catclaw.

0 to 1 inch, faintly platy or loose brown noneffervescing loamy fine sand.

1 to 12 inches, slightly granular cloddy reddish-brown noneffervescing fine sandy loam. Above a depth of 4 inches the material breaks out as medium-sized clods which shatter to a fine powder, and the color is uniform throughout the soil mass. Below a depth of 4 inches the material breaks out, when dry, as large vertical prisms with well-defined flat finely bumpy vertical faces which make sharp angles with one another. The prisms do not have definite upper or lower faces and extend below this horizon to include the upper 6 or 8 inches of the horizon below. These prisms break to large clods which shatter further to a mixture of about three-fourths subangular or almost round granules, ranging from one-eighth to one-fourth inch in diameter, and one-fourth fine powder. The granules and clods are hard when dry and mellow when moist. The surfaces of the structure fragments are slightly darker than their interiors. The soil mass is filled with pores, fine tubes, and old root channels, it is thoroughly permeated by roots, and it contains numerous worm casts.

12 to 24 inches, reddish-brown cloddy slightly granular noneffervescing clay loam. The structure of the upper 6 inches is the same as that of the lower part of the overlying horizon. Below a depth of 18 inches the granules become larger, and the structure merges to that of the layer below. The material in this layer is hard, friable, and slightly plastic.

24 to 54 inches, brownish-red friable fine-cloddy noneffervescing sandy clay loam. The material breaks into clods about one-half inch in diameter, the surfaces of which are reddish brown. It contains numerous fine pores and old root channels. A few roots permeate throughout the soil mass. Worm cavities, about one-half inch in diameter, lined with dark-brown material are in evidence.

54 to 66 inches, brownish-yellow finely cloddy loam. The material in the upper part of this layer is faintly calcareous in spots. Below a depth of 60 inches, fine white threads of carbonate of lime form a network through the soil mass, apparently filling old rootlet channels.

The material breaks to fine clods which are slightly more friable and less hard than those in the layer above.

66 to 80 inches +, yellowish-white friable highly calcareous material consisting of about equal parts of rounded nodules of lime carbonate, ranging up to three-fourths inch in diameter, and of light-brown loam. The spots of lime become less abundant with depth.

In the same cut 500 feet west of this area, the land is more sloping and the soil material is shallower. Here, the lowest layer of the profile, which is the zone of carbonate accumulation, is from 3 to 5 feet thick and merges with dull-yellow calcareous fine sandy loam containing a few white spots of lime. In an area 200 feet west, the overlying soil layers are typical and the same as those in the profile described, but the zone of carbonate accumulation ranges from only 2 to 6 inches in thickness and rests on weakly bound micaceous slightly calcareous sandstone, the crevices of which are coated with white films of accumulated lime carbonate. In another part of the cut the zone of carbonate accumulation occurs as a bed of water-worn gravel filled with accumulated carbonate of lime.

Following is a description of a profile of Miles clay loam, as observed about 20 miles northeast of Snyder in the center of survey 274, H. & T. C., block 2. This area occupies a smooth uneroded gently sloping flat with a gradient of about 2 percent. The surface layers described are from a shallow excavation, and the lower layers are from a natural deep U-shaped gully, in which the surface layers are in place on the walls. A thick sod consisting of about 80 percent buffalo grass, with minor quantities of blue grama, annual weeds, and legumes covers this area. There is also considerable mesquite brush.

0 to 4 inches, dark reddish-brown noneffervescmg silt loam or silty clay loam. To a depth of 1 inch the material is dark grayish brown and faintly platy. The material in the lower 3 inches is coarsely platy and shatters to a fine powder. The color is evenly distributed throughout the soil mass.

4 to 18 inches, dark reddish-brown noneffervescing slightly granular clay loam or clay. When the material is moist the color is rich dark reddish brown. When dry the material breaks to hard irregular clods, about 1 inch in diameter, which have bumpy surfaces and which shatter when very dry to a mass of subangular or rounded granules, about one-eighth inch in diameter, and about an equal quantity of fine powder. Plant roots permeate throughout the layer. The surfaces of the structure particles are slightly darker than their interiors. The material is somewhat plastic when wet but may be readily spaded when dry.

18 to 28 inches, reddish-brown noneffervescing cloddy clay. The granulation characteristic of the layer above fades out through this layer, the granules becoming larger and less well defined with depth.

28 to 42 inches, reddish-brown calcareous rather compact finely cloddy clay which breaks out as hard rather cubelike fragments, about three-fourths inch in diameter, with flat faces coated with a dark-brown film. The material contains a few small spots of white carbonate of lime. In this layer, plant rootlets are most abundant in the crevices between structure fragments.

42 to 72 inches, a brownish-white mixture of about equal parts of friable white rounded lumps of lime carbonate, about three-fourths inch in diameter, and dull reddish-brown clay. The material contains a few small cavities about one-half inch in diameter, filled with dark-brown material containing a network of very fine tubes of lime. The content of lumps of lime carbonate decreases with depth.

72 to 156 inches, dull-brown and light reddish-brown calcareous clay containing a rather large quantity of friable white lumps of lime carbonate. The material breaks to clods about 1 inch in diameter. The structure fragments are slightly coated with darker material. In one spot, between depths of 10 and 13 feet, the structure fragments are coated with an iron-brown film and the material contains a few glistening black crystalline concretions ranging to one-fourth inch in diameter. At the base of this layer are a few water-worn gravel.

156 to 180 inches +, pale-red slightly or moderately calcareous shaly sandy clay containing bands of white highly calcareous material. This is geological material which is probably of Permian age.

The layer from 72 to 156 inches represents the soil forming material in this case, and the change at a depth of 156 inches is a geological and not a soil change. The soil-forming material consists of reworked alluvial-colluvial material. As seen in other places, the soil also occurs on the original geological formations weathering in place.

Following is a description of a profile of Miles fine sand, shallow phase, occurring 12 miles southwest of Snyder, one-half mile south of the northwest corner of survey 121, H. & T. C., block 97. The layers down to a depth of 8 feet were seen in an excavation at the side of the road and below that were examined only with an auger. This is a smooth billowy well-drained area having a brushy covering of stunted shin oak about 2 feet high, with rather minor quantities of sand sage, little bluestem, and many other grasses and annual weeds.

0 to 9 inches, light-brown loose noneffervescing fine sand.

9 to 24 inches, pale-yellow noneffervescing faintly cloddy fine sand which is slightly red in the lower part.

24 to 48 inches, yellowish-red hard cloddy fine sandy clay loam which is friable when moist and slightly plastic when wet. When dry this material breaks into clods with cleavage lines predominantly vertical and from 1 to 4 inches apart. The clod surfaces are slick appearing, flat, and coated with a distinct film of dark-brown material. The material in this layer is noneffervescing. Rootlets permeate throughout the soil mass but are slightly more abundant along the crevices between clods. The material is filled with fine tubes, or old root channels, which are coated with a dark-colored film. In the upper part of the transitional zone, from the overlying horizon down to this, there are a few small rounded pellets of red fine sandy clay loam embedded in the fine sand. These become more numerous with depth, and within one-half inch of their first appearance the material is yellowish-red fine sandy clay loam with some of the overlying sand extending down crevices or root channels and filling old cavities through the upper 3 inches of the layer.

48 to 120 inches, yellowish-red noneffervescing fine sandy clay loam which breaks to large friable clods ranging up to 6 inches in diameter and having slick slightly darkened surfaces. Numerous fine specks, which appear to be fine concretions of some mineral rich in iron, are scattered throughout the soil mass. Old root channels are coated with brown organic films.

120 to 132 inches, a bed of noneffervescing water-worn gravel in a matrix of noneffervescing yellowish-red fine sandy clay loam.

132 to 144 inches, an almost white highly calcareous bed of friable lime carbonate, water-worn gravel, and some clay loam material. At the 12-foot depth, the white lime carbonate appears somewhat less abundant than at the top of the layer.

There are a very few small water-worn gravel, ranging up to one-eighth inch in diameter, on the surface and throughout all the soil layers, which indicate that this is not a wind deposit.

This profile of the shallow phase is given instead of that of the typical soil because it is the only available excavation showing the deep layers. In typical Miles fine sand that part of the sandy surface horizon lying below a depth of about 24 inches and above the fine sandy clay loam subsoil horizon, which occurs at a depth of about 42 inches, consists of light reddish-yellow friable cloddy fine sand.

A profile of Abilene clay loam, observed 10 miles northwest of Snyder, one-fourth mile east of Dermott on the Roscoe, Snyder & Pacific Railway, in a railroad cut with virgin sod adjacent, in a well-drained smooth almost level flat, and supporting a thick sod consisting of about 80 percent buffalo grass and minor amounts of blue grama, needlegrasses, various annual weeds, and mesquite brush, showed the following layers:

0 to 1 inch, dark grayish-brown slightly calcareous silt loam arranged in thin fragile plates.

1 to 16 inches, dark-brown noneffervescing rather granular clay loam or light clay, which breaks out as clods that when dry crumble or shatter to subangular or rounded granules, from one-eighth to one-fourth inch in diameter, and some fine powder. The surfaces of the granules are darker than the interiors. The granular condition is most distinct in the upper 10 inches of this layer, and below 10 inches the granules become larger and less definite. This layer may be easily spaded when dry. It is plastic when wet.

16 to 30 inches, brown calcareous moderately compact clay which breaks predominantly vertically to prisms and cubelike fragments from one-half to 1 inch in diameter, which have flat slick-appearing slightly darkened surfaces and sharp angles. The layer has a chocolate cast when wet.

30 to 42 inches, light-brown compact clay containing a few small spots of white carbonate of lime. This material breaks out as slightly larger fragments than those in the layer above. It contains a few darker spots of material similar to the material between depths of 1 and 16 inches. It is underlain by a 1-inch transitional layer.

42 to 66 inches, a yellowish-white mixture of white friable rounded lumps of carbonate of lime and friable light-brown clay. The carbonate of lime spots become less abundant and larger with depth.

66 to 144 inches +, pale reddish-brown and dull reddish-brown friable and more firm calcareous cloddy clay containing a few lumps of white carbonate of lime. The material includes a few spots of darker material containing more organic matter to a depth of 12 feet. In a few places there are a few specks of rust-colored or iron-black material.

Following is a description of a profile of Roscoe fine sandy loam, as observed 8 miles northeast of Snyder, at the southeast corner of survey 145, H. & T. C., block 2, in a roadside gully with the adjacent field cultivated. The area occupies a low gently sloping flat around the head of a draw. As seen in other places this soil supports a heavy sod consisting largely of buffalo grass, with a thick covering of mesquite brush, and smaller quantities of other grasses and plants.

0 to 10 inches, dark-brown noneffervescing friable cloddy fine sandy loam. Below plow depth the material is granular.

10 to 16 inches, very dark brown granular cloddy clay loam or clay, which breaks to vertical prisms from 1 to 2 inches in diameter, and the prisms break crosswise into clods. When very dry the clods shatter to rounded granules from one-eighth to one-fourth inch in diameter, and there is considerable fine powder also. The outsides of the structure particles are nearly black, and the interiors are lighter colored.

16 to 30 inches, dark-brown slightly granular cloddy clay similar to the material in the overlying horizon, though it is less dark and the granules are larger and less well defined.

30 to 42 inches, brown noneffervescing rather compact clay having a structure intermediate between those of the horizons overlying and those underlying, though the granular character has disappeared.

42 to 60 inches, light-brown faintly calcareous compact sandy clay breaking out as small vertical prisms which through cross breakage form cubelike fragments about three-fourths inch in diameter, with flat slick darkened surfaces and sharp angles.

60 to 78 inches, light yellowish-brown slightly calcareous fine sandy clay loam containing a few white spots of white lime carbonate and rather numerous round soft crystalline concretions which appear to consist of some mineral high in iron and range to one-half inch in diameter. The structure is similar to that of the layer above, although the fragments are larger.

78 to 84 inches, friable white almost pure carbonate of lime which has hardened where exposed to the air.

Below a depth of 84 inches this material rests on a bed of water-worn gravel. Although the iron-appearing concretions are very numerous in the cuts examined, they are not everywhere present in this soil.

Following is a description of a profile of Potter loam, occurring 8 miles southeast of Snyder, 0.4 mile east of the northwest corner of survey 34, H. & G. N., block 3, and occupying a sloping eroded knoll with a gradient of about 5 percent. This area is covered with a thin sod of needlegrasses, together with some grama, yucca, catclaw, and many weeds.

0 to 10 inches, brown calcareous loam containing some irregular hard fragments of lime carbonate. This material breaks out as rather fragile clods which shatter to a fine powder. It is faintly granular and contains numerous worm casts.

10 to 14 inches, light-brown highly calcareous loam containing white films of lime along crevices and fine threads of the lime throughout the soil. This layer contains a few worm casts of darker material. The soil breaks out as large vertical prisms from 3 to 5 inches in diameter, which extend up into the overlying horizon to within about 4 inches of the surface. The prisms have flat well-defined vertical faces joined by sharp angles.

14 to 30 inches +, a brownish-white mixture of about equal quantities of white friable rounded lumps of lime carbonate, about three-fourths inch in diameter, and light-brown calcareous loam.

Below a depth of 30 inches the lumps of lime become less numerous and the material is less white.

A profile of a virgin area of Vernon clay loam, examined 6 miles southwest of Snyder, 0.2 mile west of the southeast corner of survey 186, H. & T. C., block 97, on a moderate somewhat eroded slope of about 4 percent gradient, and supporting a rather thin sod of buffalo grass, needlegrass, some mesquite brush, and bluebrush, showed the following layers:

0 to 1 inch, reddish-brown calcareous silt loam arranged in very fragile plates.

1 to 10 inches, reddish-brown calcareous clay loam or clay, which breaks to friable clods ranging up to 2 inches in diameter. When very dry the clods shatter to about equal amounts of rounded or subangular granules, about one-eighth inch in diameter, and of fine powder. This horizon contains a few hard irregular concretions of carbonate of lime.

10 to 18 inches, brownish-red rather compact calcareous clay which breaks out as hard clods with slightly slick or varnished surfaces.

18 to 36 inches, dull-red highly calcareous rather friable clay containing numerous (a content of about 15 percent) soft carbonate of lime concretions. This material breaks to fragile clods, the outsides of which are coated with white films of lime.

36 to 48 inches +, red calcareous dense and compact joint clay with a band of yellowish-brown material at a depth of 40 or 42 inches. A few spots of white lime are present down to and below 4 feet. This is slightly altered geological material of Triassic age.

This soil also occurs over geological deposits of Permian age. The unaltered geological deposits generally contain no segregated white spots of lime, and those found down to a depth of 4 feet in the profile as described consist of accumulated soil lime. Commonly this soil contains rather numerous flakes of white mica which is most abundant in the lower layer and the geological material.

Table 5 shows the results of mechanical analyses of samples of several soils, taken at different depths.

TABLE 5.—*Mechanical analyses of several soils in Scurry County, Tex.*

Soil type and sample no.	Depth	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
Miles fine sandy loam:	*Inches*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
448384	0- 12	0.1	0.7	4.4	39.4	25.5	12.4	17.4
448385	12- 24	.2	.6	3 9	34.8	21.4	11.6	27.6
448386	24- 54	.3	.6	3.3	30.6	23.6	14.2	27.4
448387	54- 66	.2	.3	2 8	31 7	28.5	15.1	21.3
448388	66- 80+	4.3	2.3	3.3	22.2	20.6	20.1	27.2
448389	(1)	.2	2.7	13.6	34.4	20.1	16.0	13.1
Roscoe fine sandy loam:								
448392	0- 10	.2	.5	3.1	33.5	23.2	20.1	19.3
448393	10- 16	.1	.2	1.5	19.7	20.6	26.9	31.0
448394	16- 30	.1	.2	1.9	23.0	23.0	23.8	27.9
448395	30- 42	.3	.4	1.8	21.8	21.8	17.6	36.4
448396	42- 60	.5	.6	2.2	25.6	26.7	16.5	27.8
448397	60- 66+	5.0	4.4	3.1	15.0	18.9	18.9	34.8
Abilene clay loam:								
448349	0- 1	.4	1.3	3.4	12.3	19.4	34.3	29.0
448350	1- 16	.1	1.2	3.7	13.0	17.7	25.2	39.1
448351	16- 30	.3	1.1	3 0	10.3	14.4	22.3	48.6
448352	30- 42	1.0	1.5	2.8	8.8	12.7	21.3	52.0
448353	42- 66	1.6	2.7	3.1	8 1	11.9	24.4	48.3
448354	66-144+	.7	1.2	1.7	5.7	8.3	19.5	63.0
Abilene loam:								
448316	0- 7	.1	.7	7.3	30.5	21.8	17.7	21.8
448317	7- 18	.1	.9	6.1	21.5	22.5	20.8	28.0
448318	18- 32	.3	.8	4.3	17.3	21.4	20.7	35.2
448319	32- 48+	1.7	1.9	4.1	17.1	18.4	20.2	36.6
Miles loam:								
448308	0- 4	1.2	10.5	9.6	21.3	18.7	18.2	21.5
448309	4- 24	.9	7.0	7.1	17.8	16.1	17.3	33.7
448310	24- 40	.3	3 3	4.1	24.2	20.0	15.3	32.8
448311	40- 48	.1	.8	1.4	45.2	23.7	10.9	17.9
448312	48- 54+	.3	1.2	1.7	48.0	20.4	12 4	16.0
Valera clay loam.								
448335	0- 1	.0	.2	.9	4.5	18.2	47.6	28.5
448336	1- 12	.0	.2	1.0	5.9	17.6	36.4	38.8
448337	12- 20	.2	.3	.6	3 3	11.6	33.1	51.0
448338 [2]	20- 23+	3 8	5.8	3.7	6.7	10.4	24.7	45.0
448339	(1,3)							
Potter fine sandy loam:								
448355	0- 12	.2	.9	4.2	33 4	30.8	13.6	16.9
448356	12- 42	.8	2.9	3.8	20.6	20.6	20.2	31.1
448357	42- 48+	.1	.1	.4	18.8	46.0	15.1	19.6
Randall clay:								
448390	0- 15	.2	.5	1.7	8 5	9.9	24.5	54.6
448391	15- 42+	.5	.5	1.6	7.4	9.8	23.8	56.5
Potter gravelly loam: [4]								
448314	0- 5	3.3	4.2	7.6	20.6	23.9	22.0	18.5
448315	5- 8+	12.3	9.9	7.5	15.0	13.8	14.9	26.7

[1] Parent material

[2] This sample contained 96.5 percent of material greater than 2 mm in diameter, which was discarded before the analysis was made.

[3] A limestone containing some pure $CaCO_3$ crystals.

[4] Fine earth.

In table 6 are given the pH determinations of several soils. These determinations were made in the laboratories of the Bureau of Chemistry and Soils. The hydrogen-electrode method of determination was used.

TABLE 6.—*pH determinations of several soils in Scurry County, Tex.*

Soil type and sample number	Depth	pH	Soil type and sample number	Depth	pH
Miles fine sandy loam:	*Inches*		Miles loam:	*Inches*	
448384	0- 12	7.50	448308	0- 4	6.82
448385	12- 24	7.25	448309	4- 24	7.33
448386	24- 54	7.57	448310	24- 40	7.42
448387	54- 66	7.87	448311	40- 48	8.07
448388	66- 80+	8.03	448312	48- 54+	8.27
Roscoe fine sandy loam:			Valera clay loam:		
448392	0- 10	7.81	448335	0- 1	7.59
448393	10- 16	7.50	448336	1- 12	7.60
448394	16- 30	7.49	448337	12- 20	7.99
448395	30- 42	7.73	448338	20- 23+	8.05
448396	42- 60	8.13	448339	(1)	8.53
448397	60- 66+	8.10	Potter fine sandy loam:		
Abilene clay loam:			448355	0- 12	8.09
448349	0- 1	7.83	448356	12- 42	8.12
448350	1- 16	7.72	448357	42- 48+	8.35
448351	16- 30	7.98	Randall clay:		
448352	30- 42	7.98	448390	0- 15	7.92
448353	42- 66	8.02	448391	15- 42+	8.09
448354	66-144+	8.20	Potter gravelly loam:		
Abilene loam:			448314	0- 5	8.27
448316	0- 7	7.75	448315	5- 8+	8.27
448317	7- 18	8.02			
448318	18- 32	8.10			
448319	32- 48+	8.27			

[1] Parent rocks.

SUMMARY

Scurry County includes an area of 910 square miles in west-central Texas, in the southern part of the Great Plains of the United States, on the southwestern edge of the Rolling Plains of Texas. It consists of two plains, a lower rolling plain, which is rough in places, and an inextensive central higher flat plain. Approximately 16 percent of the county is flat, 38 percent is gently rolling, 27 percent is rolling, and 19 percent is rough.

The climate is warm and subhumid. The average annual rainfall is nearly 21 inches, and soil moisture is in general the limiting factor in the yields of crops.

In 1931, 36 percent of the land was in cultivation. Cotton occupies about 70 percent of the cultivated land, and grain sorghums and sorgo occupy nearly all the remainder. The average acre yield of cotton is about one-fourth bale and of grain sorghums is about 15 bushels.

The soils well adapted to growing crops occupy 51.4 percent of the county, soils fairly or poorly adapted to growing crops, 22.9 percent, and soils which can be agriculturally utilized only as grazing land, 25.7 percent.

There are two extensive good crop soils—Miles fine sandy loam and Abilene clay loam. Miles fine sandy loam has a reddish-brown surface soil underlain by a brownish-red heavier subsoil. It is drought resistant and fertile. Abilene clay loam has a dark-brown granular heavy clay loam surface soil underlain by more compact clay. It is fertile and productive, but not quite so drought resistant

as Miles fine sandy loam. The smooth soils of the county are characterized by comparatively dark colored somewhat granular surface soils, reddish-brown or chocolate-colored subsoils, and an underlying almost white layer of lime carbonate accumulation.

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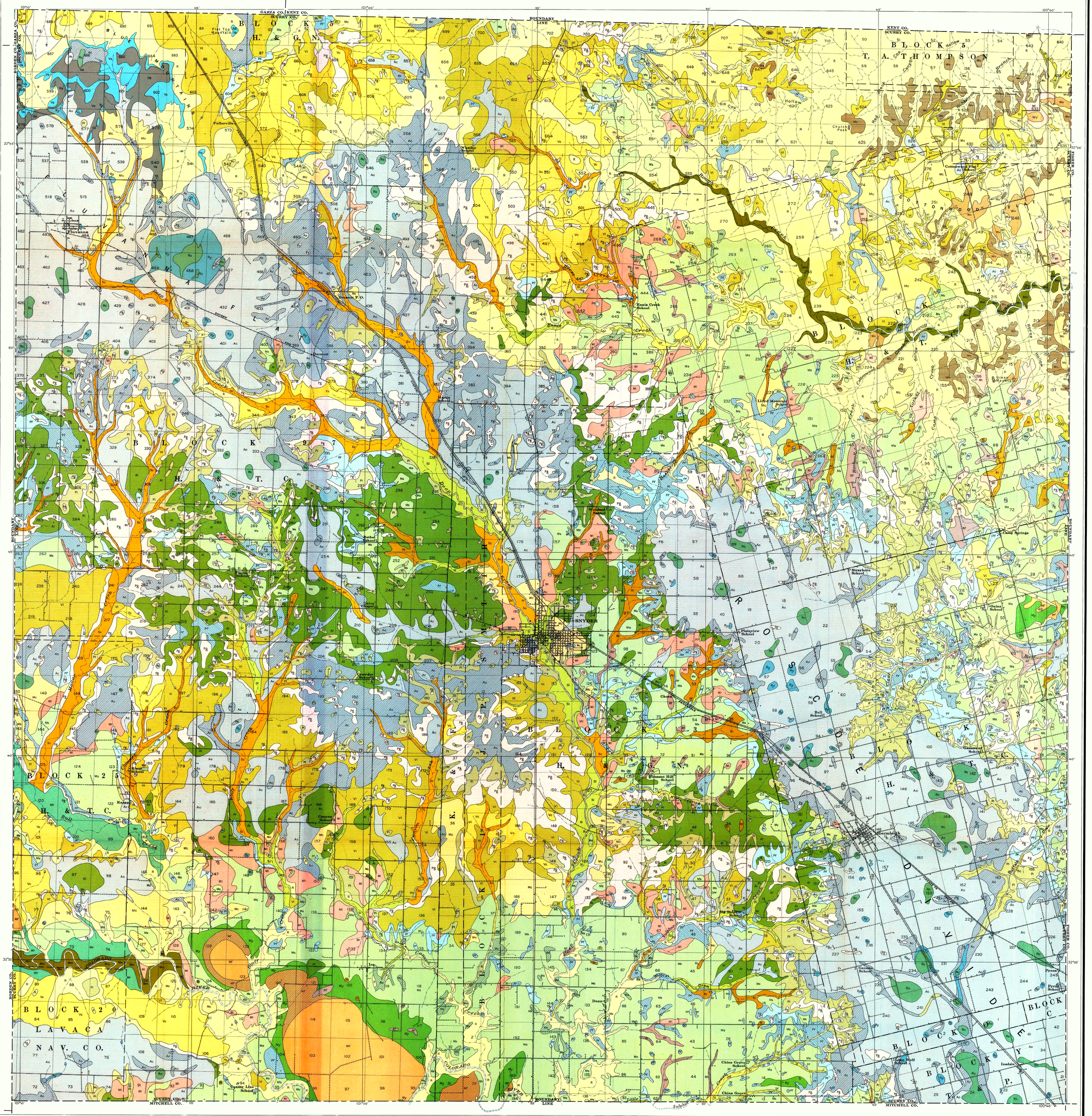
SOIL MAP
SCURRY COUNTY
TEXAS

TEXAS AGRICULTURAL EXPERIMENT STATION
A. B. CONNER, DIRECTOR



LEGEND

- Abilene loam — Al
- Abilene clay loam — Ac
- Shallow phase — Rc
- Miles fine sand — Mf
- Shallow phase — Mf
- Miles loamy fine sand — My
- Miles fine sandy loam — Ms
- Shallow phase — Ms
- Miles loam — Ml
- Miles clay loam — Mc
- Miller loam — Mm
- Miller clay loam — Mr
- Potter fine sandy loam — Pf
- Deep phase — Pf
- Potter loam — Pl
- Potter gravelly loam — Pg
- Randall clay — Rc
- Roscoe fine sandy loam — Rf
- Roscoe loam — Rl
- Roscoe clay — Ry
- Spur fine sandy loam — Sf
- Spur loam — Sl
- Spur clay loam — Sc
- Valera stony loam — Vs
- Valera clay loam — Va
- Vernon clay loam — Vl
- Vernon clay — Vc
- Weymouth very fine sandy loam — Wv
- Eroded phase — Wv
- Rough broken and stony land — R

CONVENTIONAL SIGNS

CULTURE
(Printed in black.)

City or Village, Roads, Buildings, Wharves, Jetties, Breakwater, Levee, Lighthouse, Fort
Secondary roads and Trails
Railroads Steam and Electric
Bridges, Ferry
R.R. crossings, Tunnel
Ford, Dam
School or Church Cemeteries
Mine or Quarry Mine dumps Made land
Bluff, Escarpment Rock outcrop and Triangulation station
Stony and Gravelly areas
Soil boundaries
Boundary lines
Boundary lines
Boundary lines
U.S. township and section lines

RELIEF
(Printed in brown or black)

Contours Depression contours
Prominent Hills Mountain Peaks
Sand, Wash, and Sand dunes
Shore and Low-water line, Sandbar

DRAINAGE
(Printed in blue)

Streams
Lakes, Ponds Intermittent lakes
Intermittent streams
Springs, Canals and Ditches, Flumes
Swamp Salt marshes
Submerged marsh Tidal flats

The above signs are in current use on the soil maps. Variations from this usage appear in some maps of earlier dates.

William T. Carter, Inspector, District 4.
Soils surveyed by E. H. Templin, in charge, and T. C. Reitch, Texas Agricultural Experiment Station.

Scale 1 inch = 1 mile
1 ½ 0 1 2 3 4 Miles

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